# Agoro Carbon USA Cropland Program

Document Prepared by Agoro Carbon Alliance

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| Project Title | Agoro Carbon USA Cropland Program |
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# Contents

# 1 Project Details

## 1.1 Summary Description of the Project

The Agoro Carbon USA Cropland Program is a grouped VCS project implemented by Agoro Carbon Alliance (Agoro Carbon). The Program's geographic area is delineated by political borders of the USA (excluding Alaska and Hawaii) and includes only cropland. The initial project instances are located in the following USA states: California, Colorado, Idaho, Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, Oregon, South Dakota, Texas, Washington, California.

The Program will implement a package of regenerative agricultural land management activities. The Agoro Carbon USA Cropland Program will promote reduced and zero tillage, cover cropping, improved nitrogen (N) fertiliser management and potentially also other regenerative agricultural practices on cropland in the USA as a means to reduce GHG and decarbonize agriculture. The implementation of these practices will lead to increases in carbon sequestration rates in the soil, reduced soil disturbance and soil erosion, improved crop residue and water management, as well as potentially reducing the total usage of fossil fuels.

The main objective of the Program is to provide the financial, agronomic and educational support needed for farmers to adopt new farming practices that not only produce agricultural products in a sustainable and profitable way, but also have a positive impact on climate change. During the project period, enrolled farmers will be assisted by the Agoro Carbon agronomic team to implement these project activities to transition from conventional to regenerative farming systems. Agoro Carbon's scientifically-based program is designed to overcome existing barriers that otherwise prevent the adoption of improved land management practices. Through its carbon credit Program, Agoro Carbon provides farmers with financial incentives through the issuance of carbon credits.

The baseline practices are the "business as usual" agricultural management practices made by a farmer prior to implementing the practice changes associated with their participation in Agoro Carbon's Program. For each field within the project area, past management practices (i.e. tillage, planting, harvest, and fertilisation events) over a three-year look-back period are recorded in order to determine the baseline scenario.

The project activity is following approved VCS methodology VM0042, Methodology for Improved Agricultural Land Management Version 1.0.

The project is anticipated to include ca. 216,196 acres of cropland. Using conservative estimates, we estimated 34,913 tonnes $CO_2$e per year of carbon removals and reductions to be achieved on average. In addition to the contribution to the Sustainable Development Goal (SDG) 13 Climate Action, the project activity will contribute to the following SDGs: Zero Hunger (SDG 2), Quality education (SDG 4), Clean Water and Sanitation (SDG 6) and Decent Work and Economic Growth (SDG 8).

## 1.2 Sectoral Scope and Project Type

VCS Sectoral Scope applicable to the project is Scope 14: Agriculture Forestry and Other Land Use (AFOLU). The Project activity is a grouped project and is using the VCS methodology: "VM0042, Ver 1.0, Methodology for Improved Agricultural Land Management" (ALM).

## 1.3 Project Eligibility

The grouped project is eligible under the scope of the VCS Program for the following reasons:

The project reduces GHG emissions which are included in the six accepted Kyoto Protocol greenhouse gases and accepted under the applied VCS methodology.

The project activity is following approved VCS methodology VM0042, Methodology for Improved Agricultural Land Management Version 1.0.

The project will implement a package of regenerative agricultural land management activities.

The project activity exclusively involves practices that constitute a change to historically common agricultural practices, which result in the sequestration, reduction and removal of greenhouse gases.

The project activity does not feature on the list of projects that are explicitly excluded project activities under the terms of Verra (VCS Standard, v4.2, Table 1).

The grouped project is eligible because it meets with the rules and requirements of the VCS Program criteria for GHG projects and programs.

## 1.4 Project Design

The project includes multiple locations or project activity instances, and is developed as a grouped project.

☐ The project includes a single location or installation only

☐ The project includes multiple locations or project activity instances, but is not being developed as a grouped project

☒ The project is a grouped project

### Eligibility Criteria

The inclusion of new project activity instances into the Program will be eligible for the inclusion in this grouped project provided that they demonstrate applicability of the eligibility criteria below:

| Criterion no. | Inclusion Criterion |
|---|---|
| 1 | The farmer has entered into a legal relationship with Agoro Carbon Alliance and signed the contract for the enrollment into the Program. A new project instance must introduce or implement one or more new changes to pre-existing agricultural management practices- zero tillage, reduced tillage, nitrogen management or cover cropping. |
| 2 | Project activities of the project instance must be implemented on land that is cropland at the project start date and remains cropland throughout the project crediting period. |
| 3 | The project area of the project instance must not have been cleared of native ecosystems within the 10-year period prior to the project start date. |
| 4 | The project instance shall occur within the geographic area defined in the project description and be defined using a unique geodetic polygon recorded as a KML/shape file and may be aggregated with multiple landowners. |
| 5 | The project activity of the project instance is not expected to result in a sustained reduction of greater than 5% in productivity, as demonstrated by peer-reviewed and/or published studies on the activity in the region or a comparable region. |
| 6 | The project activity does not occur on wetlands. |
| 7 | The baseline of the project instances will be the continuation of pre-project agricultural management practices, which is the most plausible baseline scenario. Project practices have not been already implemented on the acres enrolled in the Program within the past 3 years. |
| 8 | Carbon sequestration potential of the project instances, including estimation of the project baseline, project emissions and leakage, will be done in the consistent manner using modelling and/or measurement approaches, as specified in the PDD. |
| 9 | Project instances will follow the Monitoring Plan established in the PDD and meet the applicability criteria of VM0042 methodology. |

| | |
|---|---|
| 10 | Project instances will face the same barriers for implementation as defined during the project additionality assessment in Section 3.5 of the PDD, and will also fulfil the requirements to the common practice analysis defined on the project level. |
| 11 | The farmer implementing a project activity is not receiving and will not receive any other third-party or governmental Carbon Credits or payments in exchange for undertaking the regenerative practices on the acres submitted in the Program. The farmer also has not sold or transferred the carbon rights in relation to the implementation of the project activity(ies) to any third party and the project instance is not a part of any other carbon project. |
| 12 | Project instances will have a start date at the same date or later than the grouped project (i.e. the Program) start date |

## 1.5 Project Proponent

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| Organisation name | Agoro Carbon Alliance |
| Contact person | Giulia Sartori |
| Title | Head of Carbon Project Development |
| Address | 100 North Tampa Street Suite 3200, Tampa, United States 33602 |
| Telephone | +1 888 682 2726 |
| Email | carbonprojects@agorocarbon.com |

## 1.6 Other Entities Involved in the Project

Agoro Carbon Works with Soil Sampling groups Ward Labs and Deveron Labs. We also work with regional “Channel Partners” that aid in our ongoing communication efforts with our farmers. A full list of our Channel Partners has been made available to the validation body.

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| Organisation name | Ward Labs |
| Role in the project | Soil analysis |
| Contact person | Ryan Dennhardt |

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|---|---|
| Title | Human Resources Business Manager |
| Address | 4007 Cherry Ave, Kearney, NE |
| Telephone | 800-887-7645 |
| Email | customerservice@wardlab.com |

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|---|---|
| Organisation name | Deveron Labs |
| Role in the project | Soil Sampler and Tester |
| Contact person | Jenn Arneson |
| Title | Operations Coordinator |
| Address | 1534 Burlington St, Suite 102, North Kansas City, Missouri |
| Telephone | (816) 266-5329 |
| Email | jenn.stealthag@gmail.com |

## 1.7 Ownership

Agoro Carbon Alliance (hereafter “the Project Proponent”) has the ownership and legal right of the project activities. The project ownership consists of a “Carbon Credit Generation Agreement" whereby each farmer transfers title to the credits and the environmental attributes to Agoro Carbon. The Project Proponent has the ownership and legal right of developing and presenting the projects leading to the GHG emission reduction and removal, and each farmer has the legal right to control and operate the project activities occurring at farm level either via ownership, lease or other title to the land. This is demonstrated via an attestation of property rights attached to the Carbon Credit Generation Agreement, certification that is signed individually by each farmer.

Project ownership is proved by an enforceable and irrevocable agreement with the holder of the statutory, property or contractual right in the land, vegetation or conservation or management process that generates GHG emission reductions or removals which vests project ownership in the Project Proponent.

## 1.8 Project Start Date

Project start date is 01/08/2021, this date is selected as it reflects the initial implementation of activities under the first instance of the grouped project that led to the generation of GHG emission removals.

## 1.9 Project Crediting Period

The project activity instances included in the Agoro Carbon USA Cropland Program fall in the AFOLU project category 'ALM' (Agricultural Land Management). The project focuses on GHG emission removals through the sequestration of soil organic carbon (SOC), as well as emission reductions through the reduction of $N_2O$, $CH_4$ and/or fossil-derived $CO_2$ emissions. For this reason, the project crediting period is 20 years, starting from 01/08/2021 up to 31/07/2041. This crediting period may be renewed four times with a total project crediting period not to exceed 100 years.

## 1.10 Project Scale and Estimated GHG Emission Reductions or Removals

The estimated annual GHG emission reductions/removals of the project within the first instance are:

☐ <20,000 $tCO_2e$/year

☒ 20,000 – 100,000 $tCO_2e$/year

☐ 100,001 – 1,000,000 $tCO_2e$/year

☐ >1,000,000 $tCO_2e$/year

Quantification of the potential GHG impact of regenerative agriculture is challenging due to heterogeneity in management practices and variation in the physical environment. The project is anticipated to include ca. 217,563 acres of cropland. Using conservative estimates, we estimated 34,913 tonnes $CO_2e$ per year of carbon removals and reductions to be achieved on average. This estimation was calculated based on average carbon sequestration potential for each farmer using recognized and well-known publicly available modelling tool COMET Planner (Available at: http://comet-planner-cdfahsp.com/) as well as calculations of emission reductions generated from nitrogen management and/or from fuel consumption reduction at the farm level.

| **Project Scale** | |
|---|---|
| Project | |
| Large project | X |
| **Year** | **Estimated GHG emission reductions or removals ($tCO_2e$)** |

| | |
|---|---|
| 2021 | 34,913 |
| 2022 | 34,913 |
| 2023 | 34,913 |
| 2024 | 34,913 |
| 2025 | 34,913 |
| 2026 | 34,913 |
| 2027 | 34,913 |
| 2028 | 34,913 |
| 2029 | 34,913 |
| 2030 | 34,913 |
| 2031 | 34,913 |
| 2032 | 34,913 |
| 2033 | 34,913 |
| 2034 | 34,913 |
| 2035 | 34,913 |
| 2036 | 34,913 |
| 2037 | 34,913 |
| 2038 | 34,913 |
| 2039 | 34,913 |
| 2040 | 34,913 |
| 2041 | 34,913 |
| **Total estimated ERs** | 698,260 |
| **Total number of crediting years** | 20 |
| **Average annual ERs** | 34,913 |

## 1.11 Description of the Project Activity

Agriculture, as an industry, accounts for an estimated 10% of the total U.S. greenhouse gas (GHG) emissions, including carbon dioxide ($CO_2$), methane ($CH_4$), and nitrous oxide ($N_2O$) emissions (USDA-ERS). Climate change has the potential to adversely impact U.S. agricultural productivity at local and regional scales through alterations in rainfall patterns, more frequent occurrences of climate extremes (including high temperatures or drought), altered patterns of pest pressure, and changes in seasonal and diurnal temperature patterns. These impacts will affect national and international markets; the prices of food, fibre, and energy; agricultural incomes; and the environment.

While agriculture emits GHG, it also provides opportunities to reduce existing GHGs in the atmosphere. The Agoro Carbon USA Cropland Program will promote improved agricultural land management (IALM) practices, including reduced and zero tillage, cover cropping and improved nitrogen (N) fertiliser management on cropland in the USA as a means to reduce GHG and decarbonize agriculture. The implementation of these practices will lead to reduced soil disturbance and soil erosion, improved crop residue and water management, as well as potentially reducing the total usage of fossil fuels. These practices could, in turn, increase overall fertiliser and water use efficiency and potentially improve profitability at the farm level, whilst building resilience into farming systems. The project is a wide-ranging collaborative initiative between Agoro Carbon and farmers designed to channel carbon offset revenue to farmers and supporting those farmers with agronomic knowledge on regenerative practices.

The main objective of the Program is to provide the financial, agronomic and educational support needed for farmers to adopt new farming practices that not only produce agricultural products in a sustainable and profitable way, but also have a positive impact on climate change. During the project period, enrolled farmers will be assisted by the Agoro Carbon agronomic team to implement these project activities to transition from conventional to a regenerative farming system. Agoro Carbon's scientifically based Program is designed to overcome existing barriers that prevent adoption of improved land management practices. The Agoro Carbon Program farmers have an opportunity to generate carbon credits as a financial means to support their practice changes. The Program is designed to expand over time and cover a range of farmers and farming activities in the USA to help drive the critical transition to a future dominated by resilient and sustainable agricultural systems.

Farmers who participate in the Program are required to adopt one or more changes to current agricultural management practices. A change constitutes adoption of a new practice (e.g., adoption of one of the pre-defined agricultural land management practices listed below in this section of this document), cessation of a pre-existing practice (e.g., conventional tillage) or adjustment to a pre-existing practice that could lead to GHG emissions reductions and/or an increase of carbon sequestration.

The program is designed as a grouped project so that following the validation and registration, new farmers, provided that their activities meet the eligibility criteria defined in section 1.4 of this document, can continue to subscribe to the program. The initial project activity instances are located in the United States involving around 79 farms on an area of roughly 216,196 acres.

The project activity includes the implementation of the following types of regenerative agricultural practice(s) by the farmers:

**Type 1. Implementing Reduced Tillage/Improving Current Tillage Practices**

The vast majority of farmers in the United States practises some form of conventional tillage that results in a significant amount of soil disturbance, and thereby an increased $CO_2$ influx to the atmosphere. Reducing tillage mitigates these negative effects of tillage while improving the long-term soil health for the farmer. This improved agricultural practice includes one of the key concepts as outlined by USDA-NRCS[1] for improving soil health and carbon sequestration, and it involves the reduction of soil disturbance (usually shallow and without full soil inversion) from farmers' existing tillage practice (e.g. conventional tillage to reduced tillage). This includes reduction in the number of tillage passes, reduced tillage depth, strip-till, and no-till to reduce overall soil disturbance.

Farmers participating in the program to change their current tillage practices to reduced/improved tillage to sequester soil organic carbon which will in turn improve soil health. The combination of returning crop residues to the soil and reduced soil disturbance, in the long term, improves the carbon content of the soil and thereby improves soil fertility, soil structure, and water-holding capacity.

**Type 2. Implementing Zero-Till/No-Till**

No-till or zero till is defined as the absence of tillage operations from harvest of the previous crop to harvest of the current crop. Minimal soil disturbance only happens at time of planting without overturning the soil. As a result, we recommend to farmers who participate in the Project to implement no-tillage to avoid 1) a

[1]https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/soils/health/?cid%3Dnrcs142p2_053874

separate band application of fertiliser, 2) mechanical cover crop termination (with the exception of crimping), 3) tillage to suppress weeds or incorporate residue. Tillage can be implemented for remediating rutted wheel track areas created by irrigation systems.

**Type 3. Implementation of cover cropping**

Planting cover crops effectively sequesters soil organic carbon in addition to improving soil health and water quality. Cover crops are usually planted to protect the soil, retain soil moisture, recycle residual nutrients and sequester carbon rather than for the purpose of being harvested; although they could also potentially be harvested via livestock grazing, which would further enhance carbon sequestration. Cover crops can include grasses, brassicas, legumes and other broadleaf species, and can be annual or perennial plants. Popular cover crops include cereal rye, clover, vetch and oilseed radish. They can be mono or poly culture (mixture of many species).

By joining Agoro Carbon USA Cropland Program, farmers are required to plant cover crops to increase soil organic carbon stocks and the reduction of net $N_2O$ emissions if, depending on the cover crop species, a grower is able to reduce the amount of synthetic-N fertiliser applied. Leguminous cover crops are able to fix atmospheric-N and, along with brassica cover crops, provide an optimal ratio of carbon to nitrogen so that their decomposed residues add to the plant-available nitrogen pool.

**Type 4. Implementation of Nitrogen fertiliser rate management**

Managing nitrogen application rates lowers $N_2O$ emissions to the atmosphere and contributes to an overall reduction of GHG emissions. Agriculture plays a major role in $N_2O$ emissions, because of nitrogen fertiliser application. The application of N fertilisers increases available nitrogen, which enhances both nitrification and denitrification rates increasing the production of $N_2O$. The reduction of synthetic and/or organic nitrogen fertiliser application therefore results in a substantial net reduction of $N_2O$ emissions. To qualify for a nitrogen rate reduction in the program, a grower needs to demonstrate a reduction in their nitrogen rate from baseline.

In addition to the practices described above, additional practices eligible under VM0042, such as grazing cover crop and residues, adding a legume species to existing cover crops and promoting crop rotations, could be implemented in the scope of project activity.

## Project organizational setup

Farmers participating in the Agoro Carbon USA Cropland Program will submit information and records detailing their baseline practices and inputs (e.g. N fertiliser application rate) through the Agoro Carbon data management platform. These data will be standardised to quantify the carbon removed from the atmosphere. Quantification of GHG emissions reduced and/or removed from the atmosphere will be done by applying VCS approved monitoring and quantification methodologies.

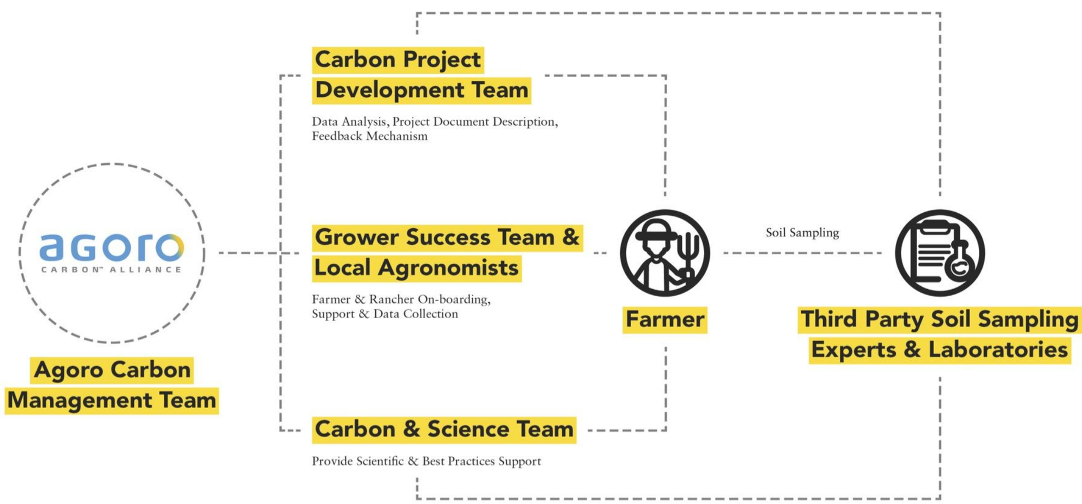


Figure 1: Agoro organizational setup

There is no REDD+ component to the project and the project is not located within a jurisdiction covered by any jurisdictional REDD+ program.

## 1.12 Project Location

The program's geographic area is delineated by political borders of the USA (excluding Alaska and Hawaii) and includes only cropland.

The initial instances are located in the following USA states: Washington, Texas, Montana, Iowa, Missouri, Idaho, Minnesota, Kansas, Illinois, South Dakota, North Dakota, Indiana, Nebraska, Wisconsin, Wyoming, and Oregon.

The KML/shapefiles files of each of the project instances will be provided at the individual project documentation during validation.

## 1.13 Conditions Prior to Project Initiation

The baselines practices are the “business as usual”, agricultural management practices made by the farmer prior to implementation of improved agricultural land management practices. These include, but are not limited to, conventional nitrogen fertiliser and tillage management practices and the absence of cover cropping. For each field within the project area, past management practices (i.e. tillage, planting, harvest, and fertilisation events) over a three-year look-back period are recorded in order to determine the baseline scenario. Baseline emissions/stock changes are then modelled or (for SOC stock change only) directly measured in baseline control sites subject to the annual schedule of activities. The crops and practices assumed in the baseline scenario are re-evaluated as required by the VCS Standard and revised, if necessary, to reflect current agricultural production in the regions.

**Topography**

The geographic map of the project area is presented below:


Figure 2: Topographic map of the Contiguous United States. Source: Nations Online Project.[2]

[2] https://www.nationsonline.org/oneworld/map/usa_map.htm

**Climate**

Due to its large size and wide range of geographic features, the United States contains examples of nearly every global climate. The climate is subtropical in the southern United States, semiarid in the Great Plains west of the 100th meridian, Mediterranean in coastal California and arid in the Great Basin, parts of the Northwest, and the Southwest.

The Great Basin and Columbia Plateau (the Intermontane Plateaus) are arid regions that lie in the rain shadow of the Cascades and Sierra Nevada. Precipitation averages less than 15 inches (38 cm). The Southwest is a hot desert, with temperatures exceeding 100 °F (37.8 °C) for several weeks at a time in summer. The Southwest and the Great Basin are also affected by the monsoon from the Gulf of California from July to September, which brings localised but often severe thunderstorms to the region.

Much of California, particularly the agriculture-rich Central Valley, consists of a Mediterranean climate, with occasional excessive rainfall from October to April and nearly no rain the rest of the year. In the Pacific Northwest rain falls year-round, but is much heavier during winter and spring. The mountains of the west receive abundant precipitation and very heavy snowfall. The Cascades are one of the snowiest places in the world, with some places averaging over 600 inches (1,524 cm) of snow annually, but the lower elevations closer to the coast receive very little snow[3].

Florida has a subtropical climate in the northern part of the state and a tropical climate in the southern part of the state. Summers are wet and winters are dry in Florida. Annually, much of Florida, as well as the Deep South, are frost-free. The mild winters of Florida allow a massive tropical fruit industry to thrive in the central part of the state, making the US second to only Brazil in citrus production in the world[4].

The Map in Figure 3 below presents the precipitation distribution in the continental USA. As it can be seen here, the highest precipitation is observed in the western part of the state of Washington, and the lowest in the Mojave Desert of Arizona and California.

[3] https://en.wikipedia.org/wiki/Geography_of_the_United_States
[4] https://en.wikipedia.org/wiki/Geography_of_the_United_States


Figure3: Average precipitation in the lower 48 states of the USA.[5]

According to the Köppen climate classification, which is one of the most widely used climate classification systems, the USA could be divided in a number of classes, as presented on Figure 4 below.

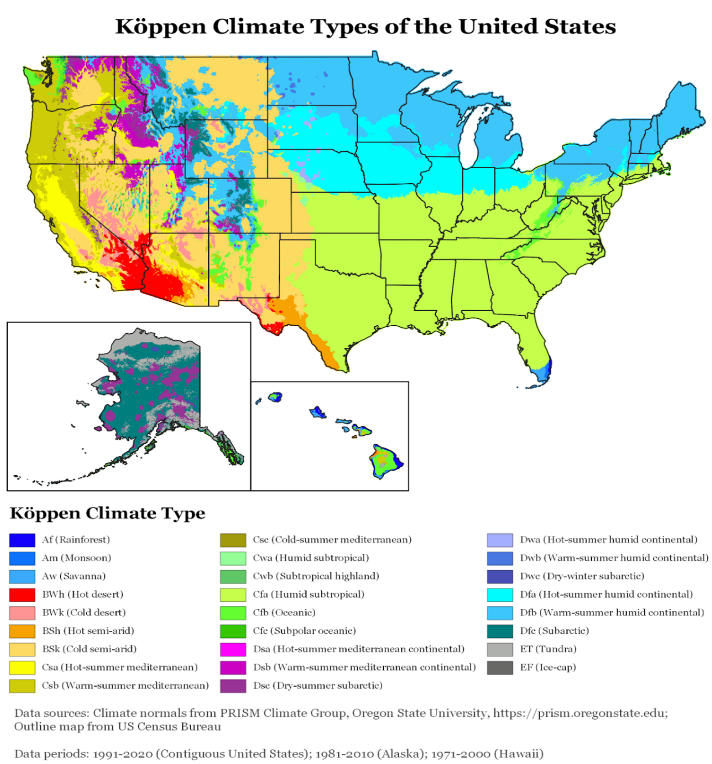


Figure 4: Köppen Climate Types Classification of USA.[6]

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[5]https://en.wikipedia.org/wiki/Climate_of_the_United_States#/media/File:Average_precipitation_in_the_lower_48_states_of_the_USA.png

[6]https://en.wikipedia.org/wiki/Climate_of_the_United_States#/media/File:K%C3%B6ppen_Climate_Types_US_50.png

The South Eastern USA is characterised by a hot-humid climate, with hot dry moving towards the western part of the US whereas, the west coast is marine. The Northern and central parts are classified as rather cold or mixed -humid areas.

**Hydrology**

The United States has an extensive inland waterway system, much of which has been improved for navigation and flood control and developed to produce hydroelectricity and irrigation water. Some of the world's largest dams, artificial lakes, and hydroelectric power plants are on U.S. rivers. The Mississippi-Missouri river system (3,890 mi/6,300 km long), is the longest in the United States and the second longest in the world. With its hundreds of tributaries, chief among which are the Red River, the Ohio, and the Arkansas, the Mississippi basin drains more than half of the nation. The Yukon, Columbia, Colorado, and Rio Grande also have huge drainage basins. Other notable river systems include the Connecticut, Hudson, Delaware, Susquehanna, Potomac, James, Alabama, Trinity, San Joaquin, and Sacramento[7].

The major river system in the United States is that formed by the Mississippi and its two major tributaries, the Ohio and Missouri rivers. This giant network drains about 41 percent of the 48-state area, including all or part of 31 states (and two Canadian provinces). The combined Missouri-Mississippi River is about 3,700 miles (5,970 kilometres) long, a distance surpassed only by the Nile and Amazon rivers. Barges can navigate the rivers upstream to Minneapolis-St. Paul, Minnesota; Pittsburgh, Pennsylvania; and Sioux City, Iowa. New Orleans, Louisiana, located near the mouth of the Mississippi, was one of the nation's leading seaports before Hurricane Katrina's devastating blow in 2005[8].

Dependence on a river is illustrated by current problems along the Missouri. Severe drought during the first decade of the twenty-first century has caused the river's flow to reach a critically low level. Recreational use, hydroelectric energy production, barge traffic, and even the domestic water supply of some riverside communities has been severely affected as a result.

Many Eastern rivers are of local importance. The Hudson River has played a very significant role in the growth of New York City. In the Southeast, the Tennessee, Cumberland, and other rivers were transformed by one of the world's most massive reclamation projects. Beginning in 1933, during the Great Depression, the Tennessee Valley Authority (TVA) built nearly 50 dams on this drainage system[9]. Their construction spurred the regional economy by creating jobs for tens of thousands of people in one of the nation's poorest regions. The dams also gave the area a clean and inexpensive source of energy(hydroelectric), controlled flooding that had long plagued the region, and created reservoirs that provide many recreational opportunities.

[7] https://www.infoplease.com/encyclopedia/places/north-america/us/united-states/physical-geography
[8] https://geography.name/physical-geography-2/
[9] https://geography.name/physical-geography-2/

In the Southwest, the Rio Grande and Colorado Rivers flow southward across desert landscapes. Both streams are of far greater importance than their relatively small volume of water might suggest. In fact, millions of people, huge cities, and billions of dollars in agricultural production depend on their flow. The Rio Grande flows from the Colorado Rockies, through central New Mexico, and into Texas, where it forms the border between the United States and Mexico.

The Colorado River is controlled by eight dams and reservoirs, including Glen Canyon Dam and Lake Powell on the Utah-Arizona border and Hoover Dam and Lake Mead just east of Las Vegas, Nevada. Huge water diversion projects have artificially supported the Southwest's booming population and economic growth. Phoenix and Tucson, Arizona, draw water from the Colorado River, as do California's Los Angeles basin, San Diego, and the agriculturally productive Imperial Valley. Las Vegas, the nation's fastest-growing city, also depends on Colorado for its water supply. Coastal southern California also obtains water from streams that flow from the Sierra Nevada[10].

The Great Salt Lake and Alaska's Iliamna are the largest U.S. lakes outside the Great Lakes and Lake of the Woods, which are shared with Canada (Lake Michigan and Iliamna are the largest freshwater lakes entirely within the United States). The Illinois Waterway connects the Great Lakes with the Mississippi River, and the New York State Canal System links them with the Hudson[11].


[10] https://geography.name/physical-geography-2/

[11]https://www.infoplease.com/encyclopedia/places/north-america/us/united-states/physical-geography#:~:text=The%20conterminous%20United%20States%20may,and%20the%20Pacific%20Mountain%20System.

Figure 5: Major river basins in the USA[12]

In many parts of the country, competing demands for water create stress in local and regional watersheds. The map below shows a "water supply stress index" for the U.S. based on observations, with widespread stress in much of the Southwest, western Great Plains, and parts of the Northwest. Watersheds are considered stressed when water demand (from power plants, agriculture, and municipalities) exceeds 40% (water supply stress index of 0.4) of available supply[13].


Figure 6: Map of water stress in the USA[14].

**Soil types**

Soils are the product of climate, organisms and topography, acting on parent (geologic) material over time. Thus the great diversity of geologic materials, geomorphic processes, climatic

[12] https://www.dailymail.co.uk/sciencetech/article-3860062/The-veins-America-Stunning-map-shows-river-basin-US.html
[13] https://www.globalchange.gov/browse/multimedia/water-stress-us
[14] https://www.globalchange.gov/browse/multimedia/water-stress-us

conditions, biotic assemblages and land surface ages in the United States is responsible for the presence of an enormous variety of mineral and organic soils.

The US soil taxonomic hierarchy includes orders, suborders, great groups, subgroups, families and series, with each series representing a unique kind of soil. In the United States, over 19,000 soil series have been identified. The percentages of land area (in the US and associated territories, etc.) occupied by soils of the twelve orders have been estimated as:

| *Type* | *Percent* |
|---|---|
| Alfisols | *14* |
| Andisols | *1.7* |
| Aridisols | *8.3* |
| Entisols | *12.3* |
| Gelisols | *8.7* |
| Inceptisols | *9.7* |
| Mollisols | *21.5* |
| Oxisols | *0.02* |
| Spodosols | *3.5* |
| Ultisols | *9.2* |
| Vertisols | *2.0* |

Table 1: Soil types distribution in the USA. Source: Soil Taxonomy. 2nd Ed.[15]

The most common soils in the USA are Mollisols and Alfisols, occupying together more than a third of the total area. The geographical distribution of the soils is presented below:

[15] Soil Survey Staff. 1999. Soil Taxonomy. 2nd Ed. USDA Natural Resources Conservation Service. Agric. Handbook 436. 871 pp.

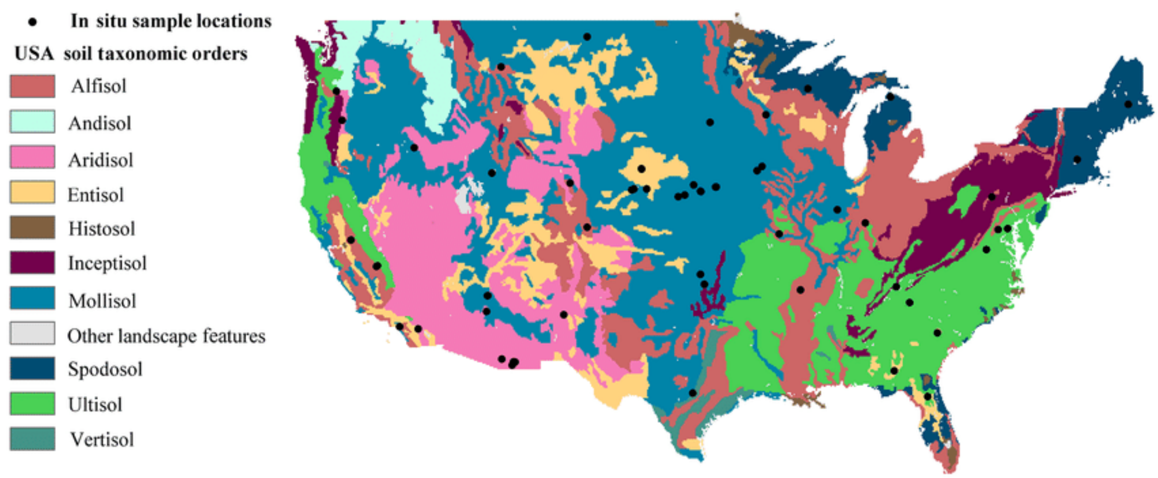



Figure 7: Map of soil taxonomic classification over the continental USA using the 12 US soil taxonomic orders (data source: United Nations, 2007), and M. Kuzila, personal communication, 2014)[16].

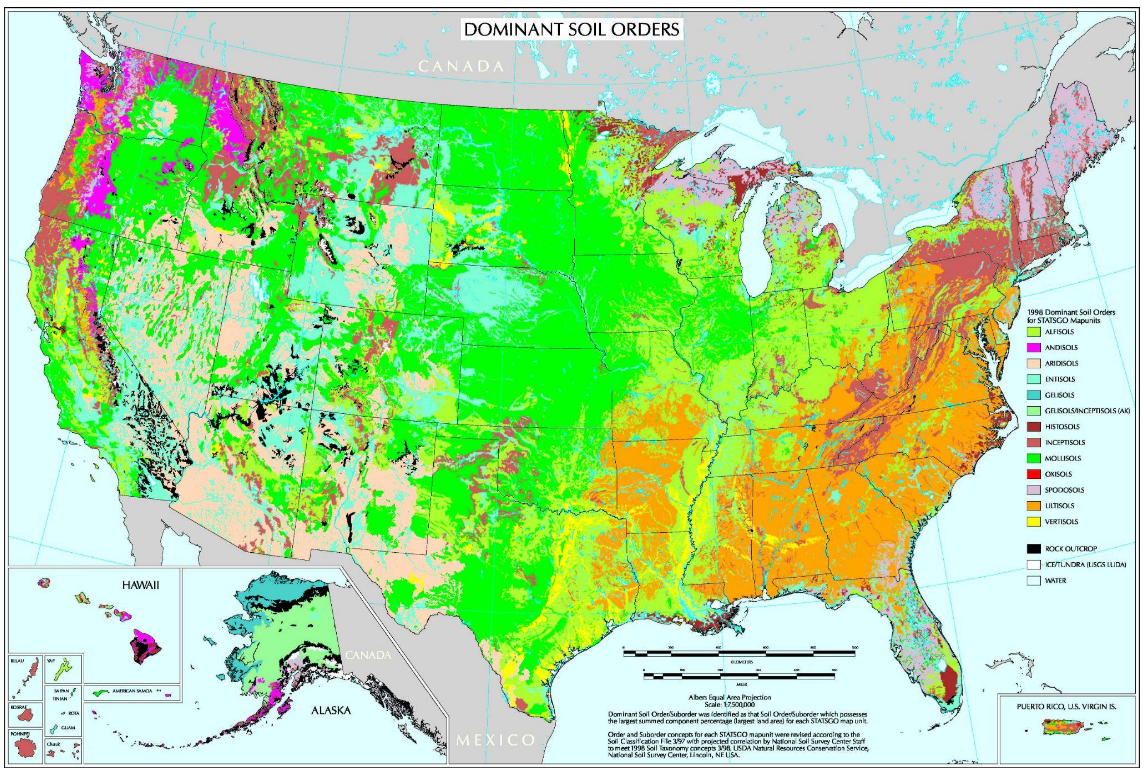



Figure 8: Map of soil taxonomic classification over the continental USA using the US soil taxonomic orders. Source: Natural Resource Conservation Service.[17]

[16]https://www.researchgate.net/figure/Map-of-soil-taxonomic-classification-over-the-continental-USA-using-the-12-US-soil_fig1_308885731

[17] https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/survey/class/maps

Alfisols and Inceptisols occur widely in the US, but the circumstances of their occurrence would be difficult to characterise briefly. The Alfisols have a subsurface ("B") horizon characterised by phyllosilicate clay accumulation (suggesting illuviation of such clay from above). The Inceptisols have a weakly developed B horizon as a consequence of weathering and/or other processes.

Andisols are found in areas where soils have formed from certain types of volcanic ejecta (usually pumice and/or volcanic ash).

Aridisols occur in parts of the western United States that are too dry for the growth of mesophytic plants.

Entisols, which exhibit little soil profile development, are characteristic of areas where soil parent materials have quite recently been deposited, e.g. on recent river alluvium.

Histosols are organic soils lacking permafrost within 100 cm of the surface; they are characteristically formed on wet sites, e.g. bogs, some fens and some muskeg areas. Some Histosols have been drained, especially to permit cultivation[18].

In the US, Mollisols occur mostly on the Great Plains, and in some areas of the west. There is a considerable variety of Mollisols, including soils very closely resembling the Chernozem ("black earth") of Eastern Europe (parts of Russia, the Ukraine and neighbouring regions), and the Chernozemic soils of the Canadian prairies.

Oxisols occur only in tropical environments, which have a very limited extent in the US.

Spodosols often occur under coniferous forest in cool, moist climates, such as South Eastern Alaska, the Great Lakes region, the North Eastern states, and higher elevations of the northwestern states. Spodosols are also found in warm, moist environments such as Florida and in fact are the most prominent soil order of the state. Spodosols have a B horizon containing a relatively high concentration of illuviated aluminium with accompanying illuviated organic matter, and in many cases, illuviated iron. Such horizons form under certain acidic leaching conditions influenced by acid decomposition products of litter accumulations under certain tree and/or shrub species. The Spodosols correspond to the Podzols of Russia, Central Europe and Northern Europe and to the Podzolic soils found in much of Canada's boreal forest.)

Ultisols are rather extensive in warm, humid regions of the US. They tend to represent rather advanced soil development, and thus are found on relatively old land surfaces.

Vertisols are not extensive in the US, being confined to areas where there is a great abundance of swelling clays, e.g. montmorillonite, that cause churning of soils as a consequence of wetting and drying cycles[19].

**Ecosystems**

[18] https://www.wikiwand.com/en/Soil_in_the_United_States
[19] https://www.wikiwand.com/en/Soil_in_the_United_States

In the United States a list of ecoregions has been developed by the U.S. Environmental Protection Agency (EPA) and the Commission for Environmental Cooperation (CEC). The Commission's 1997 report, Ecological Regions of North America, provides a framework that may be used by government agencies, non-governmental organisations, and academic researchers as a basis for risk analysis, resource management, and environmental study of the continent's ecosystems. In the United States, the EPA and the United States Geological Survey (USGS) are the principal federal agencies working with the CEC to define and map ecoregions. Ecoregions may be identified by similarities in geology, physiography, vegetation, climate, soils, land use, wildlife distributions, and hydrology.

The classification system for ecoregions has four levels, but only Levels I and III are shown on this list. Level I divides North America into 15 broad ecoregions; of these, 12 lie partly or wholly within the United States

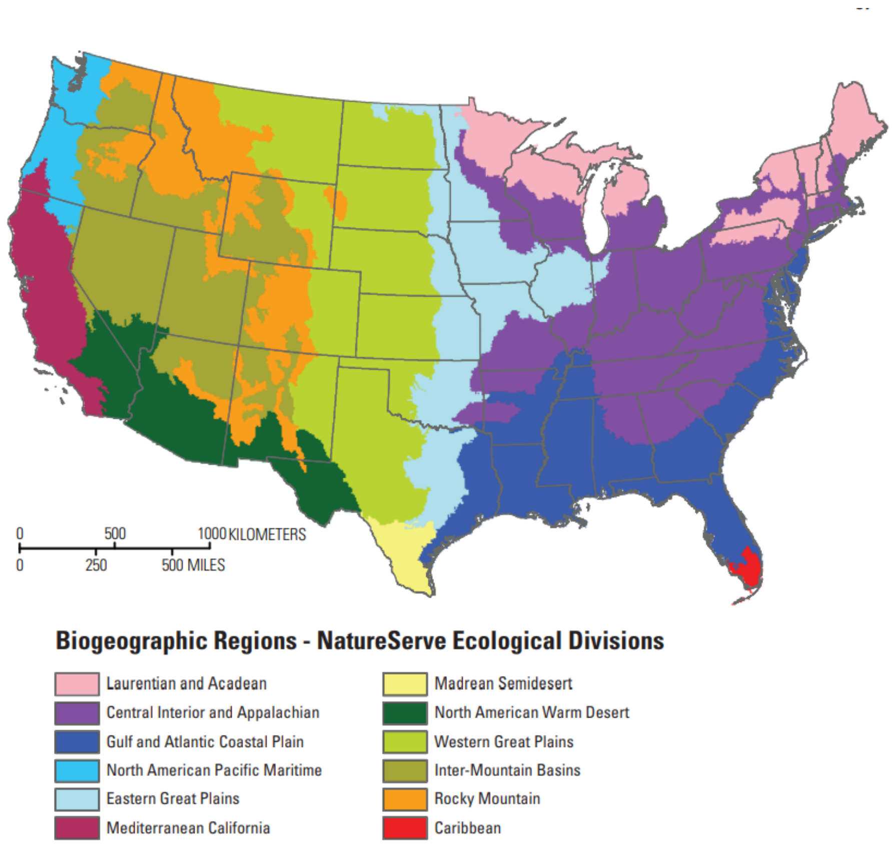



Figure 9. Map of the conterminous United States showing NatureServe's ecological divisions (Comer and others, 2003), modified from Bailey (1998b) and identifying broad areas of phytogeographic similarity (general homogeneity of vegetation assemblages). Source: USGS[20].

The distribution of the ecosystems in the continental USA is presented on Figure 9 below.

[20] https://pubs.usgs.gov/pp/1768/pp1768.pdf

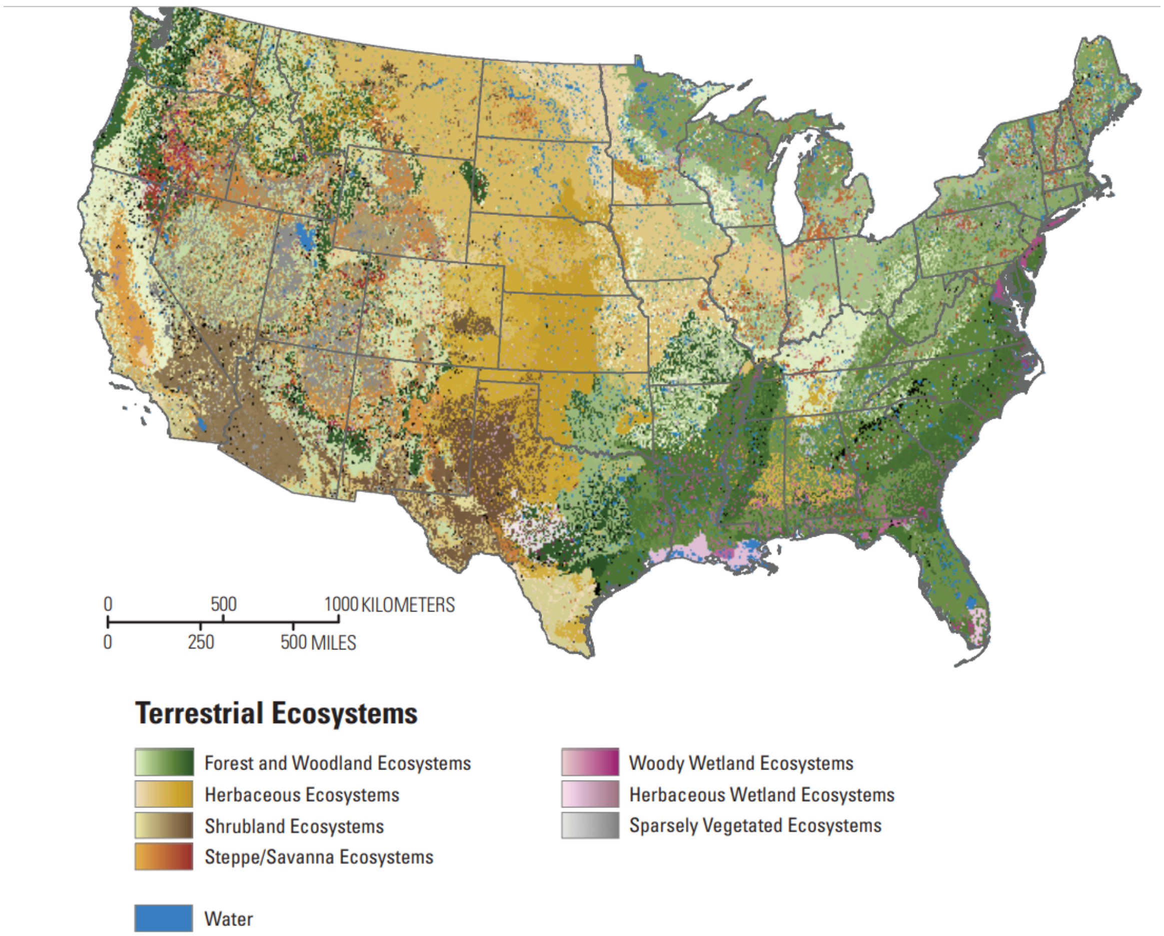



Figure 10. Map of the conterminous United States.[21]

The map in Figure 10 shows terrestrial ecosystems that were deductively modelled through biophysical stratification of the area into ecosystem footprints (physically distinct areas) and subsequent attribution of these footprints with a NatureServe ecosystem type. For this map, 419 NatureServe ecosystems were mapped, each with multiple spatial occurrences; in the figure explanation, the ecosystems are shown grouped by general biome categories[22].

**Agricultural Land use**

Although agricultural activity occurs in every state in the USA, most of the cultivated cropland (excluding California) is concentrated in three major regions of the U.S: 1) the Corn Belt (Iowa, Illinois, Indiana, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, and South Dakota), 2) the Wheat Belt (Colorado, Kansas, Oklahoma, Oregon, Montana,

[21] https://pubs.usgs.gov/pp/1768/pp1768.pdf

[22] https://pubs.usgs.gov/pp/1768/pp1768.pdf

Nebraska, Texas, Idaho, and Washington) 3) the Cotton Belt (Alabama, Arkansas, Georgia, Louisiana, Mississippi, Oklahoma, North and South Carolina, Tennessee, Texas) where cotton and rice are the major crops grown along with few other miscellaneous crops. The distribution of the cultivated land in the USA is  shown on Figure 11 below.

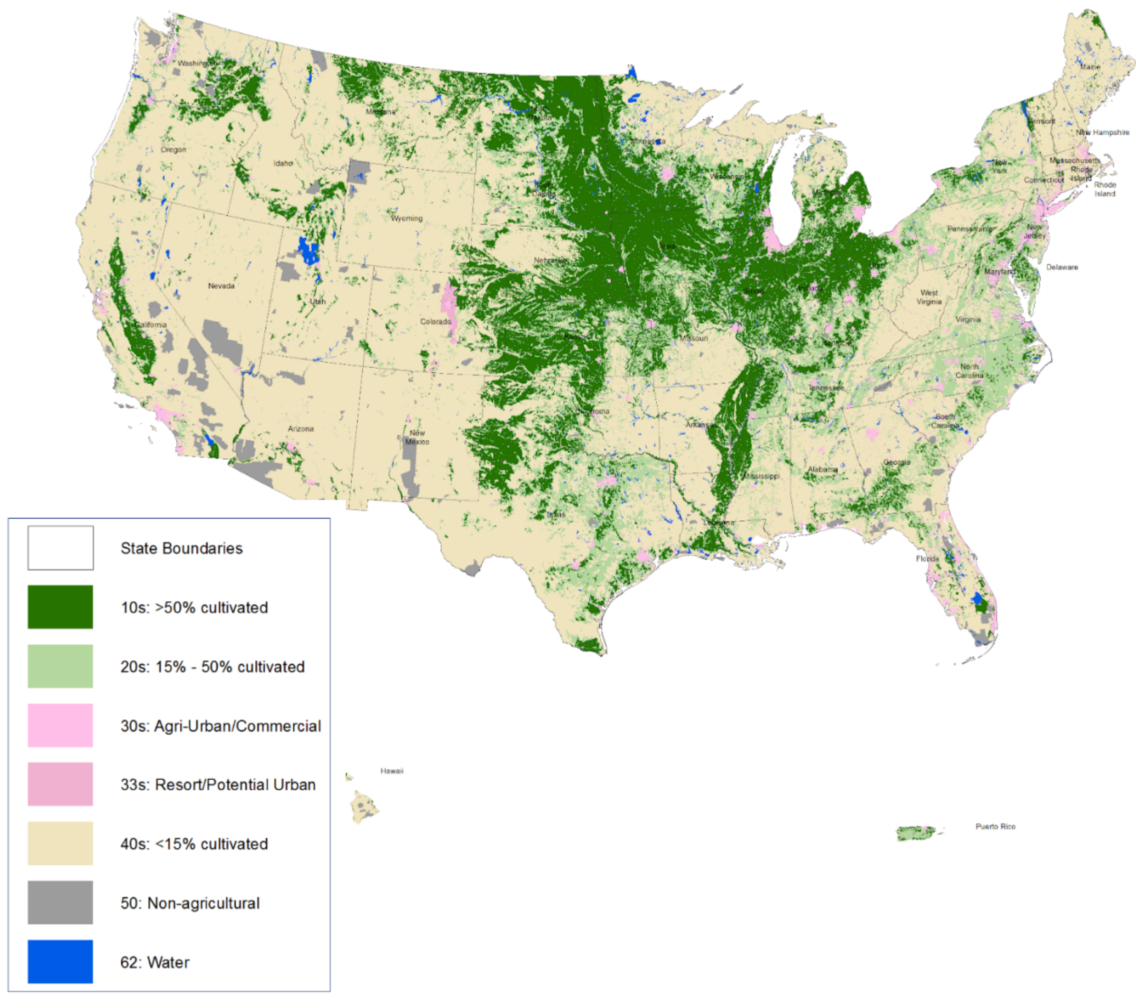



Figure 11: Land use strata in the USA.[23]

The corn belt, which is located in the midwest region of the U.S., is characterised by having a combination of the most productive soils (i.e.fertile mollisols) and favourable climatic conditions in the U.S for growing corn and soybean. The most recent USDA survey data indicates around 91 million acres are devoted to corn production and 83 million acres to soybean each year in this region, with these two crops typically grown in a 2-year rotation of alternating corn and soybean planting. These two crops are grown primarily under rain-fed conditions in the eastern corn belt and irrigated conditions in the west (i.e. Kansas and Nebraska).

The soils in the western Wheat belt states are, in general, less productive than those in the corn belt and climate conditions are more arid and water-limited; both of which limit crop yields. There

[23] https://www.nass.usda.gov/Research_and_Science/stratafront2b.php

are around 44 million acres devoted annually to either spring or winter wheat production, with spring wheat production primarily located in the northern states (i.e. Montana and North Dakota).

The soils of the southern Cotton belt are in general highly weathered due to excessive precipitation and, hence, are less productive than the Corn belt soils. Most of the crops produced in this region are grown under rainfed conditions. Cotton is planted on around 12 million acres and rice is grown on 3 million acres annually.

The distribution of primary crops across the US is presented on Figure 12 below.

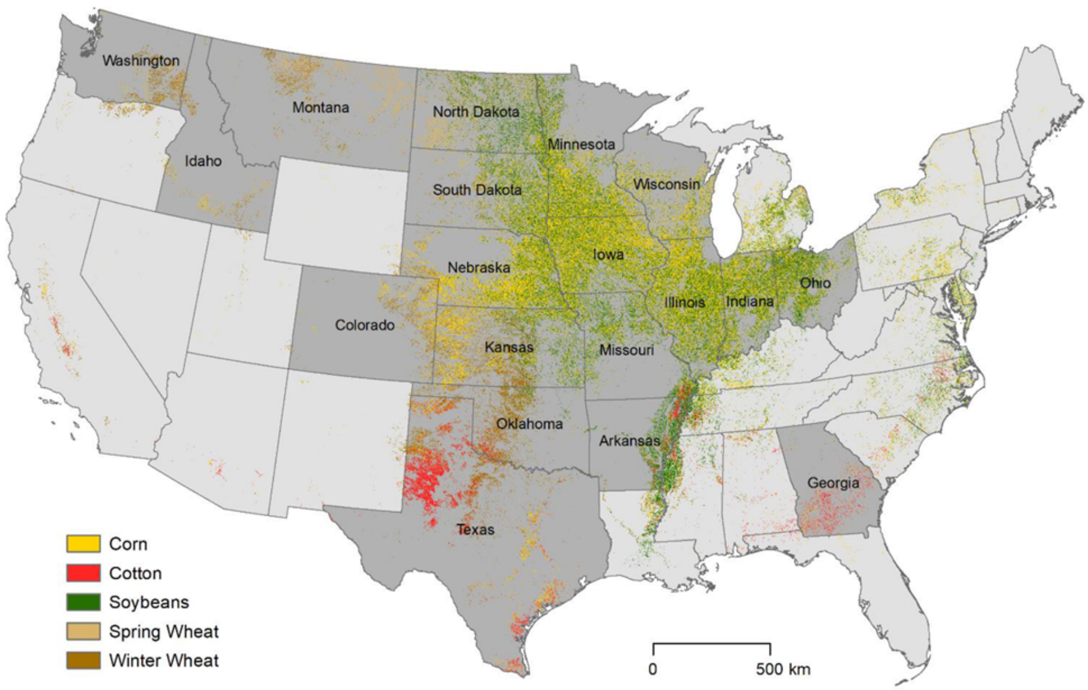



Figure 12: Map of the distribution of primary crops across the US.[24]

**Soil Organic Carbon**

SOC originally comes from atmospheric $CO_2$ that is captured by plants through the process of photosynthesis. The amount of SOC is a balance of C inputs and C losses of organic material. SOC is a complex of organic C compounds in the form of Soil Organic Matter (SOM). SOM includes everything in or on the soil that is of biological origin, irrespective of origin or state of decomposition. It includes plant and animal remains in various states of decomposition, cells and tissues of soil organisms, and substances from plant roots and soil microbes. The ultimate product of the decomposition process is humus, an amorphous array of compounds highly resistant to further decomposition. Many organic compounds in the soil are intimately associated

[24] Johnson, D.M.; Rosales, A.; Mueller, R.; Reynolds, C.; Frantz, R.; Anyamba, A.; Pak, E.; Tucker, C. USA Crop Yield Estimation with MODIS NDVI: Are Remotely Sensed Models Better than Simple Trend Analyses? Remote Sens. 2021, 13, 4227. https://doi.org/10.3390/rs13214227

with inorganic soil particles. In agricultural soils, soil organic C content is usually less than 5% and decreases with soil depth[25].

SOC is controlled by many factors that have complex interactions. These factors include soil properties, climate conditions (temperature and precipitation), land use and management practices. In natural ecosystems, rainfall and temperature are primary factors determining plant biomass input and subsequent decomposition of SOC for a given soil type. When sufficient water is provided, higher temperatures lead to faster decomposition of soil organic matter, less storage of C in the slow and passive pools, and greater loss of C through respiration. In warm climates, soil generally contains less organic soil C than in cold climates. Any management practices that impact the microbial activity and decomposition rate and those that enhance productivity and return of plant residues to the soil affect the amounts of organic C stored in the soils. Management practices such as tillage accelerate the decomposition rate of SOC by making the organic matter more available to soil microorganisms to decompose. Minimum or no tillage with residue retention has shown higher potential to maintain and or reintroduce C into soils, compared to tillage.

Estimation of SOC stock in the USA was made with the Rapid Carbon Assessment (RaCA), which was initiated by the USDA-NRCS Soil Science Division in 2010 with the following objectives:

- To develop statistically reliable quantitative estimates of amounts and distribution of carbon stocks for U.S. soils under various land covers and to the extent possible, differing agricultural management.
- To provide data to support model simulations of soil carbon change related to land use change, agricultural management, conservation practices, and climate change.To provide a scientifically and statistically defensible inventory of soil carbon stocks for the U.S[26].

[25] https://apps.ecology.wa.gov/publications/documents/1507005.pdf
[26] https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=NRCS142P2_054164

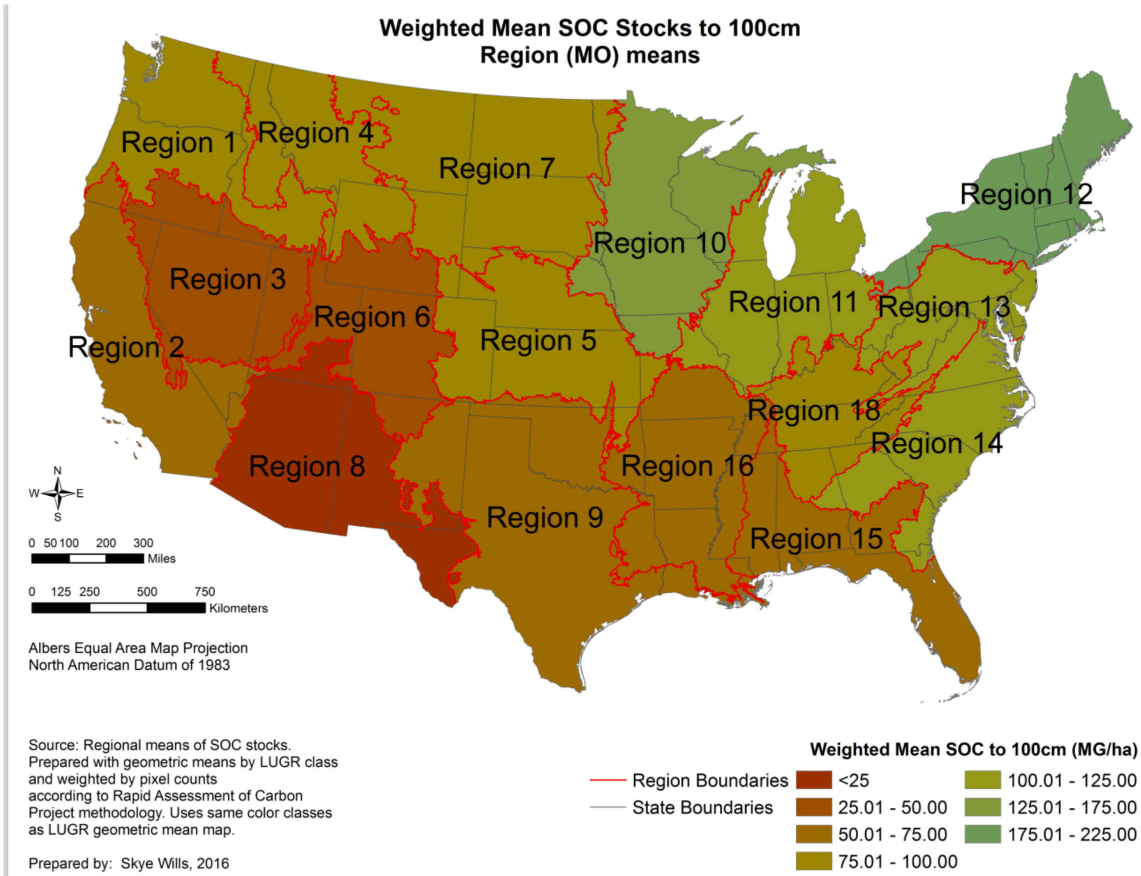



Figure 13: Map of soil organic carbon stocks in USA regions.[27]

As visible from Figure 13, highest SOC content in soils could be observed in several regions in the North-Eastern part of the USA.

The baseline scenario of the project is the same as the conditions and agricultural practices specific for each project instance existing prior to the project initiation. Section 2.4 (Baseline Scenario) will describe this in more detail.

## 1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The Agoro Carbon USA Cropland Program is designed and implemented in compliance with all applicable local, state, and federal laws, statutes, and regulatory frameworks ("Applicable Laws"). The Project Proponent has further determined that the activities and approaches of the proposed project are not prohibited by any Applicable Law.

[27] https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052842.pdf

All farmers participating in the project agree and are contractually obligated to comply with any Applicable Laws relevant to that farm. The Applicable Laws applicable to any given farm may include, without limitation, those related to: labor and employment, land use, water use, protection of the environment, and others. Relevant environmental laws that may apply to individual farms, depending on activity, may include:

- Clean Air Act (CAA) and state equivalents
- Clean Water Act (CWA) and state equivalents, including wetlands protection requirements
- Endangered Species Act (ESA) and state equivalents
- Migratory Bird Treaty Act (MBTA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and similar state laws governing chemicals
- Federal Food, Drug, and Cosmetics Act (FFDCA)

Each farm has a legal obligation to comply with any Applicable Laws, as well as a contractual obligation with the Project Proponent to adhere to and comply with Applicable Laws.

There are no laws, regulations, or other requirements at the federal, state, or local level that require the adoption and implementation of the regenerative agriculture and other practices contemplated by this Project. As a result, the Program can demonstrate a regulatory surplus in accordance with VCS requirements.

## 1.15 Participation under Other GHG Programs

### 1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project, or any of its project components, has not been registered or is not seeking registration under any other GHG programs.

### 1.15.2 Projects Rejected by Other GHG Programs

Agoro Carbon USA Cropland Program is a new project and has not been submitted or rejected by any other GHG programs.

## 1.16 Other Forms of Credit

### 1.16.1 Emissions Trading Programs and Other Binding Limits

There are no compliance emissions trading programs in the USA concerning agriculture. The current emission trading schemes such as The Regional Greenhouse Gas Initiative (RGGI) or Californian Cap-and-Trade Program in their scope are covering industries and do not impose

GHG emission caps on agriculture. The only applicable mechanisms related to the reduction of GHG emissions are voluntary carbon schemes, such as e.g. VCS and Gold Standard.

### 1.16.2 Other Forms of Environmental Credit

The Program, or any of its program components, have not been registered nor is it seeking registration under any other GHG programs.

There are several voluntary programs in the USA which reward farmers for their efforts and provide subsidies schemes, such as CSP (Conservation Stewardship Program)[28] and Environmental Quality Incentives Program[29] of the USDA. When enrolling cropland to the Program, farmers confirm in the contract with the Project Proponent, that they are not receiving any other third-party or governmental Carbon Credits or other forms of environmental credits or payments in exchange for undertaking the regenerative practices on the acres submitted to the Program. The farmers also confirm that they have not sold or transferred the carbon rights in relation to the implementation of the project activity(ies) to any third party and the project instance is not a part of any other carbon project.

This will be controlled during the verification process through the control of the geographical location of the project instances and the available information on any other participation of the same fields in any other scheme or Program.

## 1.17 Sustainable Development Contributions

Implementation of project activities will not only lead to the sequestration of carbon from the atmosphere, but it will address some of the United Nations Sustainable Development Goals. These goals seek to address development in a sustainable and climate oriented manner. The project is expected to contribute to the following sustainable development goals (SDGs):


[28] https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/csp/?cid=nrcseprd1297344
[29] https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/

| SDG | Target | Indicator |
|---|---|---|
| SDG 2 - Zero Hunger | 2.3. By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment | Amount of financial rewards provided to the farmers during each monitoring period (Indicator 2.3.2)<br>Proportion of agricultural area under productive and sustainable agriculture (Indicator 2.4.1) |
| SDG 4 Quality Education | 4.4 "By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship" | Number of farmers (m/w) along the value chain who will receive training and agronomic advice/support each year will be applied |
| SDG 6 Clean Water and Sanitation | 6.4. "By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity"[30] | Increase in soil organic carbon and soil water holding capacity |
| Goal 8: Decent Work and Economic Growth | 8.2 "Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors" | Increase in yield on the long term |
| SDG 13 Climate Action | 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries | Total GHG emissions per year, in $tCO_2e$ |

Table 3: Overview of the Projects contribution to SDG Goals, targets and corresponding indicators

## 1.18 Additional Information Relevant to the Project

[30] https://soilhealthinstitute.org/wp-content/uploads/2016/11/case-summary-water-final-101316.pdf
https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0215702&type=printable

## Leakage Management

Improved ALM projects can result in leakage through new application of manure from outside the project area (i.e., manure applied in the project from outside of the project area, that was not previously applied in the historical baseline period), productivity declines, and/or the displacement of livestock outside of the project boundary. VM0042 methodology identifies following types of leakages:

**Leakage from New Application of Manure from Outside the Project Area**

If manure is applied in the project that was not applied in the historical baseline period, there is a risk of activity shifting leakage. To account for this type of leakage, a deduction must be applied unless:

1. The manure applied in the project is produced on-site from farms within the project area;
2. The manure can be documented to have been diverted from an anaerobic lagoon; or
3. The deduction represents the portion of the manure carbon which remains on the project area without degrading during the project term and which would have otherwise been stored in agricultural land outside of the project area

In order to account for this type of leakage, the amount of manure applied, and the sourcing of manure will be continuously monitored on each project instance. The data collection team will be responsible for the data collection and analysis on a yearly basis. Where relevant, the deduction will be applied in line with the requirements of the Section 8.4.1 of the VM0042 methodology during each monitoring, the results will be reported in the monitoring report and will be subject to verification.

**Leakage from Livestock Displacement**

This type of leakage is not applicable to cropland and project activity

**Leakage from Productivity Declines**

Market leakage is likely to be negligible because the land in the project scenario remains in agricultural production. Further, producers are unlikely to implement and maintain management practices that result in productivity declines, since their livelihoods depend on crop harvests as a source of income. Nevertheless, to ensure leakage is not occurring, the following steps will be completed by Agoro Carbon every 10 years:

Step 1: We will demonstrate that the productivity of each crop product has not declined by more than 5% in the project scenario by comparing:

Average with-project productivity (excluding years with extreme weather events) of each crop product will be compared to average pre-project productivity of the same crop product OR

The ratio of average baseline productivity to regional productivity at time t will be compared to the average ratio of project productivity to regional productivity at time t + 10 years, by crop product, using regional data from government (e.g., USDA Actual Production History (APH) data), industry, published, academic or international organization (e.g., FAO) sources.

Step 2: We will determine whether the crop/livestock productivity decline was caused by a short-term change in productivity, by excluding all data inputs from the first three years of project implementation on a farm from the analysis.

Step 3: If the productivity decline will be observed, we will determine whether the productivity decline was limited to a certain combination of factors by stratifying the analysis by:

1. Practice change category
2. Practice change category combinations
3. Crop type
4. Soil type, and/or
5. Climatic zone

If the productivity decline is limited to a certain combination of factors, then that combination will become ineligible for future crediting.

For the analysis of leakage from productivity decline, we will collect the data on the average productivity for different types of products during the monitoring phase.

### Commercially Sensitive Information

Project participant identity, property, and financial information will be excluded from the public version of the project description due to confidentiality concerns.

### Further Information

N/A

# 2 SAFEGUARDS

## 2.1 No Net Harm

Nitrogen fertilisers are present in the baseline and project scenario. In the baseline scenario, conventional nitrogen fertiliser is applied by some farmers. In the project scenario, nitrogen use is actively managed. Farmers must demonstrate a reduction in their nitrogen rate from baseline. This is demonstrated in the baseline scenario and monitoring parameters section of this project description. Per VM0042 *Methodology For Improved Agricultural Land Management v.1,* $N_20$ emissions from nitrogen fertilisers are included in the project boundary.

Reducing nitrogen application rates lowers $N_2O$ emissions to the atmosphere and contributes to an overall reduction of GHG emissions. By working with farmers in the management of their nitrogen inputs, we are seeing increased biodiversity and other related flora, resulting in healthier cropland soils. Through continuous monitoring of implementation, farmers find the optimal amount of nitrogen for not only the health of their enrolled acres, but the surrounding ecosystem.

## 2.2 Local Stakeholder Consultation

As soon as a farmer joins Agoro Carbon's Program, an in person meeting with our Grower Success Team is scheduled. This will be their first point of contact since they have been handed off from the sales team, and the beginning of communication during the contract lifetime.

Each farmer has direct contact with an Agoro Carbon Staff member from initial contact throughout the entire contract period to answer any and all questions, as well as provide Agoro Carbon Program updates. For questions specific to carbon markets and our interactions with Verra and others, farmers are able and encouraged to contact members of the Carbon Team.


Figure 14: Farmer contact points with Agoro Carbon

Input from our farmers and others in the US agricultural space informed every aspect of project design. Agoro Carbon has carefully catered our contracts with farmers to ensure the project activities fit the specific needs and are in fact additional.

Our approach of continuous contact with our farmers isn't limited to their one on one contact with Grower Success Team members, but can be found through mailers, and various regional events. Agoro Carbon hosts "Grower Appreciation Events" which all farmers are invited to. Here, farmers can meet other Project participants as well as other members of Agoro Carbon staff that can answer any questions as well as share contact information for any further questions. A full transcript of the event which includes location details, a summary of attendees,and organisations has been provided to the VVB.

## 2.3 Environmental Impact

There are no environmental impact assessments planned for this project. The project does not introduce any additional wildlife that aren't present in the baseline scenario. There will be instances where new flora is introduced via new seeding of native and non-native species of grass and cover crops. The species introduced to the project area are carefully selected to not compete with native species and will be managed and monitored. Seeding of native grasses in tandem with hardier grasses that have been introduced to project areas will bring about increased forage stock as well as greater carbon sequestration potential.

No Environmental Impact Assessment is needed for this project. Robust soil sampling is conducted to understand the baseline scenario. Soil sampling is conducted again at verification. Several samples throughout each project instance are taken and sent to an independent third party.

## 2.4 Public Comments

Pending start of 30 Day Public Comment Period.

## 2.5 AFOLU-Specific Safeguards

Agoro Carbon does not own or control the land on which the project operates and relies on the voluntary participation of farmers to implement sustainable agricultural practices which reduce and remove GHG emissions. Our farmers hear about us through multiple channels including; radio and internet advertisements, trade shows, local events that Agoro Carbon participates in, channel partners and most commonly, word of mouth from other farmers. Once interested farmers are identified, Agoro Carbon then identifies individuals associated with the farmers that could be impacted by the implementation of the Program.

When a farmer demonstrates interest in the Program, Agoro Carbon staff members follow up to answer any questions, describe the Program in further detail, and ultimately offer a contractual agreement to participate.

Once a grower has agreed to participate in the Agoro Carbon Program, identification of secondary stakeholders is conducted through conversations with our farmers and channel partners. We've identified all individuals who will be affected by our project, upstream and downstream, and they can be found in the table below.

| Stakeholder Category | Stakeholders Identified | Risk To Stakeholder Category | Risk Mitigation | Ongoing Communication |
|---|---|---|---|---|
| Project Participants and their families | All participating farmers | Lower than expected yields in the initial years | Agoro Carbon pre-payments to cover for potential short term losses | Ongoing communication outlined in section 2.2 |
| Channel Partners | Agoro Carbon Alliance works with several channel partners. A full list has been made available to the validation body. | None expected | N/A | Regular communication between Agoro Carbon's Grower Success Team and Channel Partners occurs. Channel Partners are rigorously onboarded |
| Soil Samplers | Ward Laboratories Inc. and Deveron | Bodily harm when conducting soil samples on rough terrain. | Internal SOPs surrounding health and safety when selecting companies to conduct soil samples. | Agoro Carbon facilitates communication and planning between soil samplers and farmers throughout the project lifecycle. |
| Local Agronomist | Local Agronomist through USDA Agricultural Extension Offices | None expected | N/A | Agoro Carbon encourages all farmers that consult with their local USDA Agricultural Extension Agents to inform their agent of the Agoro Program and provide contact information. |

For a more detailed look at our identified stakeholders, and how we interact with them, please see the text below.

**Project participants and their families**

When we visit our project participants, meetings are typically held at dinner tables and living rooms. It's rare that only the farmer himself is present; immediate and extended family members, neighbours and friends all come from near and far to learn about what the Program will entail. In person meetings with our sales, grower success, and or channel partners represent a critical time for engagement. During this time the terms and conditions of participation are laid out and full comprehension of rules and requirements is ensured. Before signing any documentation linking them to our project, full comprehension of the above mentioned tennants is ensured.

**Channel Partners**

Agoro Carbon staff can be found all throughout the country. They have deep connections in the areas they serve, with most having prior agricultural experience in the communities we serve. In some areas, like West Texas and parts of Washington State for example, channel partners play an integral role in initial communication with project participants. Their local knowledge and connections are integral to our operation in the spirit of building trust and relationships in the communities they have long been serving. Working through a third party always comes with a particular set of risks that are addressed prior to contracting with channel partners. Agoro Carbon conducts an Integrity Due Diligence (IDD) report before working with any and all business partners as a standard operating procedure. These IDD reports cover the following areas:

- Corruption
- Financial crime
- Sanctions
- Human rights
- Commercial failures

**Soil samplers**

Agoro Carbon has a strong commitment to the integrity of our results. Soil sampling is key in determining baseline carbon during the onset of the project as well as the general understanding of carbon stock change as the project progresses. Agoro Carbon uses third parties to conduct soil samples. There is an inherent risk posed to soil samplers when going out into the field. A great deal of our parcels of land are in rural, hard to reach areas. Communication between landowners and soil samplers is facilitated by Agoro Carbon so that all parties agree not only on a time and place, but also to ensure soil samplers are aware of potential hazards they may face.

**Local Agronomist**

Our farmers utilise local agronomists working through the USDA Agricultural Extension regional offices. Once our farmers learn of new practices they can implement, they are encouraged to speak with these agents to get a better understanding if the offered suite of activities is right for them, and if so, how to implement the practices.

# 3 Application of Methodology

## 3.1 Title and Reference of Methodology

The project applies VM0042 Methodology for Improved Agricultural Land Management, v1.0 and the relevant module VMD0053 Model Calibration, Validation, and Uncertainty Guidance for the Methodology for Improved Agricultural Land Management, v1.0.

## 3.2 Applicability of Methodology

VM0042 Methodology in section 4 Applicability conditions defines following applicability criteria:

| **Criterion** | **Approach(es) to meet the criterion** |
|---|---|
| Projects must introduce or implement one or more new changes to pre-existing agricultural management practices which:<br>- Reduce fertiliser (organic or inorganic) application;<br>- Reduce tillage/improve residue management;<br>- Introduce cover cropping | The project regenerative practices, as described in Section 1.11, are listed as eligible practices under VM0042 methodology. The project will assure that the different types of project practices will be implemented on the field. This is prescribed by the contract the farmers are signing with the Program, and will be controlled by the usage of remote sensing data, direct monitoring and where feasible by conducting the interviews with the farmers. |
| Any quantitative adjustment (e.g., decrease in fertiliser application rate) must exceed 5% of the pre-existing value. | The application rates of the fertiliser will be monitored and compared with the baseline usage rate to assure a minimum of 5% change. |
| Project activities must be implemented on land that is either cropland or grassland at the project start date and remains cropland or grassland throughout the project crediting period (i.e., land use change is not eligible, including conversion from cropland to grassland and grassland to cropland). | Farmers are obliged in the contract with Agoro Carbon to assure that the project is cropland and remains cropland during the project crediting period. This will be controlled by the usage of remote sensing data where feasible and by conducting the site visits and observations on the farms. |
| The project area must not have been cleared of native ecosystems within the 10-year period prior to the project start date. | This is prescribed by the contract the farmers are signing with the Program, and will be controlled by the usage of |

| | |
|---|---|
| | remote sensing data where feasible and by conducting the interviews with the farmers. |
| The project activity is not expected to result in a sustained reduction of greater than 5% in productivity, as demonstrated by peer-reviewed and/or published studies on the activity in the region or a comparable region. | Market leakage is likely to be negligible because the land in the project scenario remains in agricultural production. Further, farmers are unlikely to implement and maintain management practices that result in productivity declines, since their livelihoods depend on crop harvests as a source of income. Nevertheless, to ensure leakage is not occurring, the following will be completed every 10 years:<br><br>Average with-project productivity (excluding years with extreme weather events) of each crop/livestock product will be compared to average pre-project productivity of the same crop/livestock product OR the ratio of average baseline productivity to regional productivity at time t will be compared to the average ratio of project productivity to regional productivity at time t + 10 years, by crop/livestock product, using regional data from government (e.g., USDA Actual Production History (APH) data), industry, published, academic or international organisation (e.g., FAO) sources. |
| The project activity cannot occur on a wetland. | This is prescribed by the contract the farmers are signing with the Agoro Carbon for the participation into the Program. |

| | |
|---|---|
| Where empirical or process-based models used to estimate stock change/emissions meet specific conditions:<br><br>- Publicly-available<br>- Shown in peer-reviewed scientific studies to successfully simulate changes in soil organic carbon and trace gas emissions resulting from changes in agricultural management included in the project description;<br>- Able to support repetition of the project model simulations.<br>- Validated per datasets and procedures detailed in VMD0053 "Model Calibration and Validation Guidance for the Methodology for Improved Agricultural Land<br>- Management", with model prediction error calculated using datasets and using the same parameter sets applied to estimate stock changes/emissions in the project. | The models used to estimate stock change/emissions meet specific conditions will follow the requirements of the VMD0053 "Model Calibration and Validation Guidance for the Methodology for Improved Agricultural Land Management" and will be supported by the independent 3rd party assessment and based on the results of the peer-reviewed publications. |

## 3.3 Project Boundary

All GHG sources and pools are accounted for in the project boundary. The rationale behind their exclusion or inclusion comes from VM0042 Version 1.0 and is annotated in the tables below.

All carbon pools besides Soil Organic Carbon are omitted due to the fact that VM0042 Version 1.0 lists them as optional or not included.

| Source | Included? | Justification/ Explanation |
|---|---|---|
| Aboveground woody biomass | No | Aboveground woody biomass must be included where the project activities may significantly reduce the pool compared to the baseline. In the business as usual scenario, our farmers do not incorporate any type of woody biomass. |
| Above ground non-woody biomass | No | Carbon pool does not have to be included because it is not subject to significant changes, or potential changes are transient in nature, per the VCS rules. |

| | | |
|---|---|---|
| Belowground woody biomass | No | This is an optional pool. As with aboveground woody biomass, belowground woody biomass is likely to be only minimally present and unlikely to be impacted by project activities. |
| Belowground non-woody biomass | No | This carbon pool does not have to be included because it is not subject to significant changes, or potential changes are transient in nature, per the VCS rules. |
| Dead wood | No | This carbon pool does not have to be included because it is not subject to significant changes, or potential changes are transient in nature, per the VCS rules. |
| Litter | No | This carbon pool does not have to be included because it is not subject to significant changes, or potential changes are transient in nature, per the VCS rules. |
| Soil Organic Carbon | Yes | Major carbon pool affected by project activity that is expected to increase in the project scenario and is therefore required to be included. |
| Wood Products | No | Carbon pool is optional in ALM project methodologies and may be excluded from the project boundary per the VCS rules. |

| Source | Gas | Included? | Justification/ Explanation |
|---|---|---|---|
| Soil organic carbon | $CO_2$ | Included | Soil organic carbon is measured on the onset of the project to account for the baseline and periodically measured throughout the project lifetime every 5 years. |
| Fossil Fuel | $CO_2$ | Excluded | Excluded. Project activities will not result in a significant increase in the use of fossil fuels. Fossil fuel usage has been found to be de minimis. Supporting evidence has been given to the validator. |
| Soil Methanogenesis | $CH_4$ | Excluded | This is not applicable in the project scenario. |
| Enteric Fermentation | $CH_4$ | Included | Stocking rate is taken account for throughout the project lifetime. |

| | | | |
|---|---|---|---|
| Manure Deposition | $CH_4$ | Included | Using modelled approaches based on stocking rate numbers per VM0042 requirements this source is included. |
| | $N_2O$ | Included | |
| Use of nitrogen fertilisers | $N_2O$ | Included | The use of nitrogen based fertilisers is managed and monitored in the project scenario. |
| Use of nitrogen fixing species | $N_2O$ | Included | The use of nitrogen fixing species is managed and monitored in the project scenario. |
| Biomass burning | $CO_2$ | Excluded | Excluded. Project activities will not result in a significant increase in $CO_2$ This has been found to be a de minimis source. Supporting evidence has been given to the validator. |
| | $CH_4$ | Excluded | Excluded. Project activities will not result in a significant increase in $CH_4$ This has been found to be a de minimis source. Supporting evidence has been given to the validator. |
| | $N_2O$ | Excluded | Excluded. Project activities will not result in a significant increase in $N_2O$.This has been found to be a de minimis source. Supporting evidence has been given to the validator. |
| Woody biomass | $CO_2$ | Excluded | Excluded. Project activities will not result in a significant increase in $CO_2$ This has been found to be a de minimis source. Supporting evidence has been given to the validator. |

S* Must be included where the project activity may significantly increase emissions compared to the baseline scenario and may be included where the project activity may reduce emissions compared to the baseline scenario.

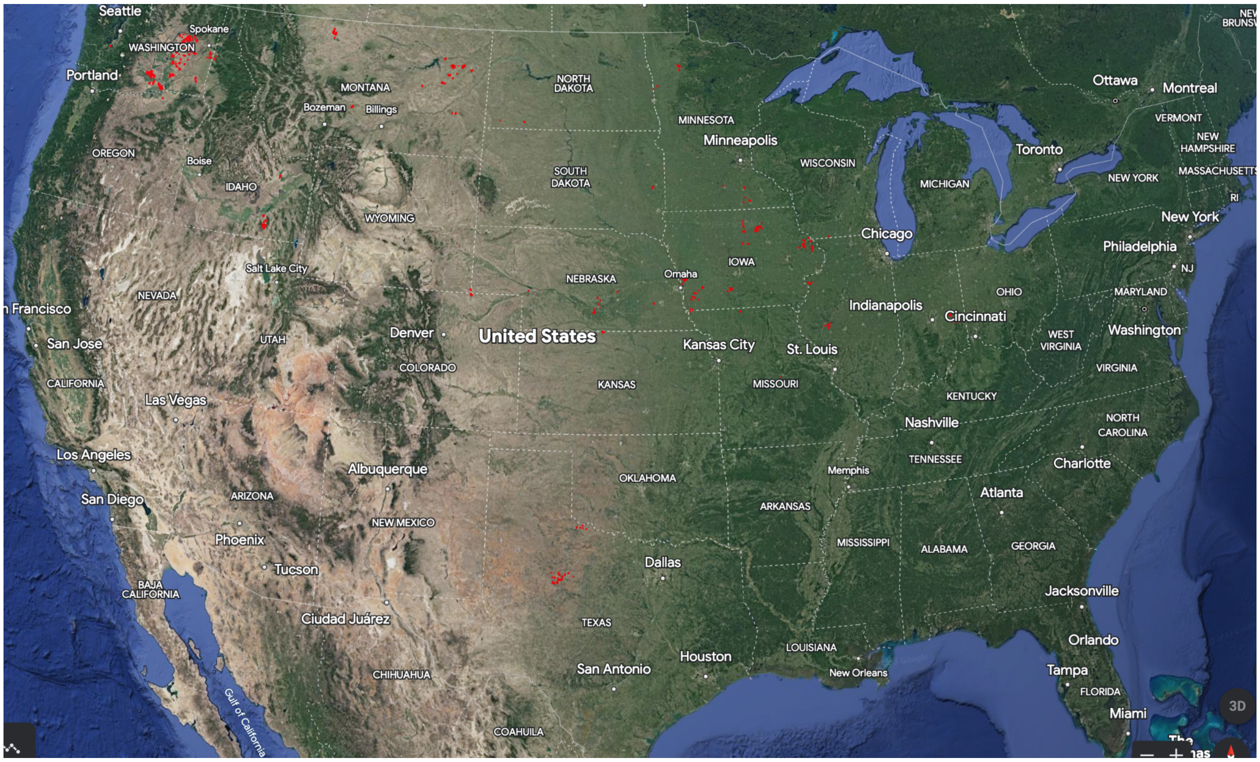



Figure 15: Map of project locations

## 3.4 Baseline Scenario

The continuation of pre-project cropland management practices is the most plausible baseline scenario. Historical management practices at the field level are determined via a 3-year or a full crop rotation lookback period. The evidence that makes up our 3 year look back period consists of management plans, field boundaries, machine data, receipts, and/or other supporting documentation. This evidence is summarised here and will be provided to the VVB as supporting documentation. The practices carried out in the 3 years preceding the program are in line with the most common practices in their respective regions. This can be attested to by USDA and state level data.

For each field the historic look back data is used to create a schedule of activities. This forms the basis for the schedule of activities to be used in modelling changes of SOC stocks following VM0042 Approach 1. The schedule of activities modelled per instance will be re-evaluated throughout the crediting period to reflect current agricultural production in the region. Published regional agricultural production data from within the 10-year period preceding the end of the current baseline period has been consulted.

The rationale and sources for supplying quantitative and qualitative data is derived from VM0042's Box 1. Qualitative and quantitative data pertaining to management practices has been sustained by signed attestations from farmers.

## 3.5 Additionality

The additionality of the project is performed following the project method as specified in the applied methodology. In order for the project to be considered additional, in addition to the demonstration of regulatory surplus, the following shall be conducted:

- Identify barriers that would prevent the implementation of a change in pre-existing agricultural management practices
- Demonstrate that the adoption of the suite of proposed project activities is not common practice

The additionality of the project is demonstrated below.

## 1. Regulatory surplus

There are no laws, regulations, or other requirements at the federal, state, or local level that require the adoption and implementation of regenerative agriculture and other practices contemplated by this Project. As a result, the project can demonstrate a regulatory surplus in accordance with VERRA requirements for VCS projects.

## 2. Barrier Analysis

There are numerous barriers for the farmers to implement project practices in the USA. These are described in the sections below in more detail.

*Barrier 1. Investment / Financial barrier*

Economic barriers were named as most common barrier for regenerative agricultural practices implementation in USA[31]**.** The lack of facilitating infrastructure to support adoption of conservation practices is an important structural barrier for the farmers[32]. The capital investments and education supported are required to update farm equipment and management skills to adopt conservation practices.

According to Xie 2014 as cited Ranjan et al 2019, high implementation costs emerged as a barrier to adoption of changing to no-till from conventional tillage farming, nutrient management in the USA. Costs associated with establishment and termination of cover crops were also identified as barriers to adoption of cover crop practice (Krajewski 2017; Reimer, Weinkauf, and Prokopy 2012; Roesch-McNally et al. 2017 as cited Ranjan et al 2019).

In the United States, government-backed conservation incentive programs such as the Conservation Stewardship Program (SCP) through Natural Resource Conservation Service (NRCS) aim to reward and incentivize practices that protect soil and biodiversity. However, they

[31] Holly Jean Buck · Alexis Palumbo-Compton (2022) Soil carbon sequestration as a climate strategy: what do farmers think? https://doi.org/10.1007/s10533-022-00948-2

[32] Gruver, J.B. (2017) 'Slow to change': Farmers' perceptions of place-based barriers to sustainable agriculture

often fall short as smaller farmers are outmanoeuvred, and payments are not suited to farmers' specific needs. Similarly, financial institutions are often reluctant to offer loans to farmers to support a transition plan due to a lack of certainty in returns. Also, the process of applying for government conservation programs and their associated requirements was predominantly discussed as a barrier to conservation program adoption. Concerns with excessive paperwork, lengthy application processes, and program complexity and requirements were discussed as hindering enrollment[33].

Lastly, some conservation practices do not result in an immediate improvement to farm profitability or productivity but are instead long-term investments in a farm's system. Thus, switching practices may require upfront investments made solely to improve the system that might not yield tangible economic gains, at least early on. For example, unlike commodity crops, winter cover crops do not necessarily produce marketable products that could be sold to help recoup costs of planting and maintenance. This can make it challenging for a grower to offset the costs of winter cover planting and termination and thus reduces motivation to plant winter cover without any perceived upside, such as improvements to productivity or resilience[34].

The development of this carbon Program and generation of carbon revenues will allow Agoro Carbon to provide project participants (farmers) upfront and continuing funding support for the investment in the needed infrastructure and educational/training resources needed for them to overcome the cost constraint barriers to implement the project activity.

*Barrier Nr. 2: Risks of yield shortage*

Farmers often are also concerned about reduced yield as result of regenerative agriculture practices implementation, which influence the adoption of cover crops (Roesch-McNally et al. 2017), conservation tillage (Reimer, Weinkauf, and Prokopy 2012), reduced nitrogen application (Stuart, Schewe, and McDermott 2014) as cited by Ranjan et al 2019. The key findings of the study conducted by Tolivere et al 2014 support the hypothesis that soil and climate factors impact no-till yields relative to tillage yields and may be an important factor influencing risk and expected return and the adoption of the practice by farmers[35]. Pittelkow et al. 2015 suggests that improved targeting and adaptation, possibly including additional system modifications, are necessary to optimise no-till performance and contribute to food production goals[36]

In this Program Agoro Carbon will provide continuous agronomic support tailored to each of the farmers enrolled into the Program on the correct and most efficient implementation approach for

[33] Ranjan, P., Church, S. P., Floress, K. & Prokopy, L. S. Synthesizing Conservation Motivations and Barriers: What Have We Learned from Qualitative Studies of Farmers' Behaviors in the United States? Soc. Nat. Resour. 32, 1171–1199 (2019)
[34] Roesch-McNally, G. E. et al. The trouble with cover crops: Farmers' experiences with overcoming barriers to adoption. Renew. Agric. Food Syst. 33, 322–333 (2018).
[35] Toliver, D.K., Larson, J.A., Roberts, R.K., English, B.C., De La Torre Ugarte, D.G. and West, T.O. (2012), Effects of No-Till on Yields as Influenced by Crop and Environmental Factors. Agron. J., 104: 530-541. https://doi.org/10.2134/agronj2011.0291
[36]Pittelkow, Cameron & Linquist, Bruce & Lundy, Mark & Liang, Xinqiang & van Groenigen, Kees Jan & Lee, Juhwan & Van Gestel, N. & Six, J. & Venterea, Rodney & Kessel, Chris. (2015). When does no-till yield more? A global meta-analysis. Field Crops Research. 183. 156-168. 10.1016/j.fcr.2015.07.020

the implementation of practices in order to reduce risks of yield shortage. The Program also will provide carbon finance as price premium in order to mitigate farmers risk related to any disturbances in farms operation and will help to compensate any possible yield shortages on the short-term, thus helping to overcome this barrier as well.

*Barrier Nr. 3: Lack of knowledge and skills in project implementation*

Farmers run complex operations on their land. Unpredictability from nature and the market leaves little room for experimentation or divergence. A farmer runs their business based on their expertise working with the land and collective knowledge and experience.

Introducing new agricultural practices increases the complexity in farm management. Changing a practice requires significant time and resources, and typically significant risk is assumed by the farmer in changing their operations. Most studies identify compatibility of conservation practices with farm management and additional management efforts as a barrier for practice implementation in the USA (Ranjan et al 2019).

Educational barriers, such as lack of knowledge on how to implement the practices, were a widely cited barrier to adoption of regenerative agricultural practices[37]. To bring regenerative agriculture practices into use, the farmers need region-specific knowledge from trusted sources and have confidence that they have sufficient knowledge or guidance to implement regenerative agricultural practices and how this implementation will impact their short-term and long-term production. Often farmers have a lack of knowledge on conservation agriculture due to long-standing relationships with agricultural consultants who are trained in traditional ways of farming. They operate mostly in a traditional way and lack trusted technical, financial, institutional, and peer support to aid in implementing regenerative agricultural practices[38][39].

For example, in the USA the cover crop termination and residue incorporation, due to their demand on farmers' time and wet conditions during spring, were perceived to be inconvenient and risky for farmers (Christianson et al. 2014 cited Ranjan et al 2019). Buck 2022 suggested that this could be remedied by more technical assistance[40]. In order to close this educational gap Agoro Carbon will provide continuous agronomic support specific to each of the farmers enrolled into the Program on the correct and most efficient implementation approach for the implementation of project practices. These activities will enable to remove this barrier for the farmers enrolled into Agoro Carbon Program.

*Barrier Nr. 4: Social barrier*

[37]Holly Jean Buck · Alexis Palumbo-Compton(2022) Soil carbon sequestration as a climate strategy: what do farmers think

[38] Ranjan, P., Church, S. P., Floress, K. & Prokopy, L. S. Synthesizing Conservation Motivations and Barriers: What Have We Learned from Qualitative Studies of Farmers' Behaviors in the United States? Soc. Nat. Resour. 32, 1171–1199 (2019)

[39] Patagonia-backed report identifies barriers to regenerative ag in the US (regenfarming.news)

[40]Holly Jean Buck · Alexis Palumbo-Compton(2022) Soil carbon sequestration as a climate strategy: what do farmers think

There are also social barriers that play an important role in reducing adoption rates of conservation practices[41]. To survive and thrive over generations, farmers depend on their communities for mutual support and shared knowledge. Therefore social norms and level of local community adoption are important factors in practices implementation.

Transitioning to regenerative agriculture involves the putting down of traditional agricultural methods and practices that have been relied on and trusted by farmers for years.[42] Grower perceptions of practices, such as beliefs that conservation practices present a risk to cash crop yields and beliefs around low overall profitability and high labor demand, reduce the likelihood that farmers will make a practice change[43].

Carolan 2006 has found that farmers were in most cases hesitant to try practices that have not been adopted by the surrounding agricultural and grower-peer community[44]. Also blame shifting was mentioned by Ranjan et al 2019 as hindering adoption.(Ranjan et al 2019).

Agoro Carbon Program is aimed to increase the adoption rate of agricultural practices in the farmers community, thus helping overcome this barrier in the long term. Also, Agoro Carbon education campaign on regenerative agriculture and capacity building activities with the farmers on the benefits of project practices for the soil health and also for the increase in yield on the longer term will lead to the shift the perception of the social norm and will contribute to elimination of this barrier.

## 3. Common practice analysis

The common practice analysis is conducted for each US state, in which initial instances (farmers) are enrolled, in line with the requirements of applied methodology on the analysis on 2nd level jurisdiction.

Adoption rates for N management best management practices in the US are calculated based on literature sources and surveys, and for the no-till, reduced till and cover crop practices are calculated based on the SEP Additionality Tool v1.0 published by Climate Action reserve[45], taking also into account geographical distribution of the initial instances enrolled into the Program. The detailed analysis on the adoption rates for each of the project practices and/or combination of the practices has been performed in a separate calculation file “Common practice assessment_PDD_Cropland USA_final draft.xlsx”.

[41] Holly Jean Buck · Alexis Palumbo-Compton(2022) Soil carbon sequestration as a climate strategy: what do farmers think
[42] Patagonia-backed report identifies barriers to regenerative ag in the US (regenfarming.news)
[43] Rodriguez, J. M., Molnar, J. J., Fazio, R. A., Sydnor, E. & Lowe, M. J. Barriers to adoption of sustainable agriculture practices: Change agent perspectives. Renew. Agric. Food Syst. 24, 116 60–71 (2009).
[44] Carolan, M. S. Do You See What I See? Examining the Epistemic Barriers to Sustainable Agriculture*. Rural Sociol. 71, 232–260 (2006)
[45] U.S. Soil Enrichment Protocol - Climate Action Reserve : Climate Action Reserve

The analysis of adoption rates of project practices demonstrates that in each of the US states in question the adoption rates for each of the project practices and/or combination of the practices is below the 20% threshold. As a result, it is proven that the project activity does not constitute a common practice.

Based on the analysis presented above, all steps to prove the additionality are satisfied and the project activity is additional.

## 3.6 Methodology Deviations

There are no methodology deviations in this project.

# 4 Quantification of GHG Emission Reductions and Removals

## 4.1 Baseline Emissions

Soil Organic Carbon

Soil organic carbon (SOC) will be quantified using Quantification Approach 1, Equation 2, as defined in VM0042 Section 8.2.1, using the DayCent model. DayCent is a process-based and publicly available model, which is commonly used to simulate changes in SOC and GHG fluxes over time. Accurate simulations are obtained at the field and soil strata-level using farm data, given different ecosystem and management scenarios.

In the baseline scenario, a grower's cultivation and practice history will be collected for a 3-year historical period or one full crop rotation prior to their enrollment in this Program. Directly measured SOC will be used to initialize soil C pools. The practice history will be entered into the DayCent schedule file to establish a baseline time series for simulating SOC.

$CO_2$ from Fossil Fuels

Project activities will not result in a significant increase in the use of fossil fuels. Fossil fuel usage has been found to be de minimis and therefore it is not included. Supporting evidence has been given to the validator.

Methane

$CO_2e$ for livestock enteric fermentation $CH_4$ emissions in the baseline scenario will be calculated according to Equation 6, as outlined in VM0042 Section 8.2.5, using Quantification Approach 3. Head of livestock will remain constant in the baseline and project scenario.

$CO_2eq$ for manure deposition $CH_4$ emissions in the baseline scenario will be calculated according to

Equation 7, as outlined in VM0042 Section 8.2.6, using Quantification Approach 3.

Nitrous Oxide

$CO_2e$ for nitrogen fertilizer and nitrogen-fixing species $N_2O$ emissions in the baseline scenario will be calculated according to Equations 11-20, as outlined in VM0042 Section 8.2.8, using Quantification Approach 3.

$CO_2e$ for manure deposition $N_2O$ emissions in the baseline scenario will be calculated according to

Equations 21, 22, 23, 24, 25, 26, as outlined in VM0042 Section 8.2.9, using Quantification Approach 3.

All parameters used in the above equations are defined in Sections 5.1 and 5.2

## 4.2 Project Emissions

For SOC emissions in the project scenario, all DayCent model settings will remain the same as the baseline scenario, except for specific management changes to be undertaken by the project. For each soil strata and management combinations, we run DayCent for the full timeseries for a business-as-usual baseline scenario and again for the selected practice changes in the project scenario. The difference in total SOC will be tracked in grams per meter and converted to a combined change in $CO_2e$/acre. Table 3 outlines the model scenarios within this project under Quantification Approach 1, with the exception of manure application and enteric fermentation from grazing management improvements.

For livestock enteric fermentation ($CH_4$) and manure deposition ($CH_4$, $N_2O$), project emissions are calculated according to Quantification Approach 3 with monitored parameters. In all cases, the same equations will be used from the baseline scenario.

## 4.3 Leakage

This project does not cause GHG emissions to change outside of the project boundary as a result of the adopted practices or changes to existing practices. Potential leakage for the project boundaries will be accounted for according to VM0042 v1.0 Section 8.4.1. The Agoro Carbon Ready USA project will manage leakage activities for the following scenarios:

- Carbon application displacement (manure, biosolids, compost)

When carbon based applications are obtained from outside the project area, or from a source that was previously used to provide methane capture or soil amendments for other farms (i.e. was previously destined for another use besides waste), a deduction for that displaced carbon will be calculated to align with Equation 28 from VM0042 Section 8.4.1.

- Declines in productivity

Although it is not anticipated to be a problem over the project lifetime, yield can sometimes decline as a result of newly instituted regenerative practices (as described in Section 3.5 Additionality). If it occurs, the quantification methods outlined in VM0042 Section 8.4.3 will account for this paradigm and be managed with the collection of yield data. If yield decreases by more than 5% per field over the quantification period, excluding outlier climatic events, the following steps will be taken to account for the decrease:

Step 1. Using yield data, calculate the change in productivity per enrolled fields per farm according to Equation 29 in VM0042 Section 8.4.3.

Step 2. If productivity has declined by more than 5%, recalculate the first step excluding the first 3 years of data post-project implementation, i.e. compare the historical productivity with only the most recent data from the project.

Step 3. If the calculation in step 2 still demonstrates a loss in productivity greater than 5%, perform a multi regression analysis to determine the root cause of the decrease in productivity. If no single variable can be determined to be causal, then the field becomes ineligible for carbon crediting.

However, if a particular regenerative practice can be determined as the principal agent responsible for the decrease, then the field can still be eligible for a carbon credit after application of an alternative regenerative practice.

## 4.4 Net GHG Emission Reductions and Removals

Net GHG emission reduction and/or removals are calculated according to VM0042 Section 8.5 using Equation 31, $CO_2$ removals are quantified using Equation 33. $CH_4$ reductions are quantified using Equations 38, 39, 40, and 41. $N_2O$ reductions are quantified using Equation 44. The ex ante estimate of VCUs is shown in the table below.

| Year | Estimated baseline emissions or removals ($tCO_2e$) | Estimated project emissions or removals ($tCO_2e$) | Estimated leakage emissions ($tCO_2e$) | Estimated net GHG emission reductions or removals ($tCO_2e$) |
|---|---|---|---|---|
| 2021 | 0 | 34,913 | 0 | 34,913 |
| 2022 | 0 | 34,913 | 0 | 34,913 |
| 2023 | 0 | 34,913 | 0 | 34,913 |
| 2024 | 0 | 34,913 | 0 | 34,913 |
| 2025 | 0 | 34,913 | 0 | 34,913 |
| 2026 | 0 | 34,913 | 0 | 34,913 |
| 2027 | 0 | 34,913 | 0 | 34,913 |

| | | | | |
|---|---|---|---|---|
| 2028 | 0 | 34,913 | 0 | 34,913 |
| 2029 | 0 | 34,913 | 0 | 34,913 |
| 2030 | 0 | 34,913 | 0 | 34,913 |
| 2031 | 0 | 34,913 | 0 | 34,913 |
| 2032 | 0 | 34,913 | 0 | 34,913 |
| 2033 | 0 | 34,913 | 0 | 34,913 |
| 2034 | 0 | 34,913 | 0 | 34,913 |
| 2035 | 0 | 34,913 | 0 | 34,913 |
| 2036 | 0 | 34,913 | 0 | 34,913 |
| 2037 | 0 | 34,913 | 0 | 34,913 |
| 2038 | 0 | 34,913 | 0 | 34,913 |
| 2039 | 0 | 34,913 | 0 | 34,913 |
| 2040 | 0 | 34,913 | 0 | 34,913 |
| 2041 | 0 | 34,913 | 0 | 34,913 |
| **Total** | 0 | 698,260 | 0 | 698,260 |

# 5 MONITORING

## 5.1 Data and Parameters Available at Validation

| | |
|---|---|
| **Data / Parameter** | AR |
| **Data unit** | Percent |
| **Description** | Weighted average adoption rate |

| | |
|---|---|
| **Source of data** | Calculated for the project across all activity instances, see file named "Common practice_USA_PDD cropland_final draft.xlsx" |
| **Value applied** | Calculated for the project across all activity instances, see file named "Common practice_USA_PDD_final draft.xlsx" |
| **Justification of choice of data or description of measurement methods and procedures applied** | Calculated value – equation 1 of the methodology. Calculated based on the area of proposed project-level adoption of each activity |
| **Purpose of Data** | Assessment of the common practice |
| **Comments** | N/A |

| | |
|---|---|
| **Data / Parameter** | $Area_{an}$ |
| **Data unit** | Acres |
| **Description** | Area of proposed project-level adoption of each activity |
| **Source of data** | Calculated for the project across all initial activity instances based on project records. |
| **Value applied** | See the file "Common practice_USA_PDD_cropland_final draft.xlsx" outlining area for each practice/mix of practices and US state |
| **Justification of choice of data or description of measurement methods and procedures applied** | Fixed value for initial group of project instances. Calculation is based on the projects records - based on the values specified in contracts with farmers (SalesForce) |
| **Purpose of Data** | Assessment of the common practice – equation 1 of the methodology. |
| **Comments** | Delineation of the sample unit area may use a combination of GIS coverages, ground survey data, remote imagery (satellite or aerial photographs), or other appropriate data. Any imagery or GIS datasets used must be geo-registered referencing corner points, clear landmarks or other intersection points |

| | |
|---|---|
| **Data / Parameter** | $EA_{an}$ |
| **Data unit** | Percent |

| | |
|---|---|
| **Description** | Adoption rate of the n largest most common proposed project activity in the region |
| **Source of data** | Soil Enrichment protocol (SEP), Additionality tool, available at https://www.climateactionreserve.org/how/protocols/soil-enrichment/ |
| **Value applied** | Since adoption rates are determined for each project practice/mix of practices in each state, there are numerous different values. Values are provided in calculation file „Common practice_USA_PDD_cropland_final draft.xlsx“ |
| **Justification of choice of data or description of measurement methods and procedures applied** | N/A, fixed value for initial group of project instances |
| **Purpose of Data** | Assessment of the common practice – equation 1 of the methodology. |
| **Comments** | N/A |

| | |
|---|---|
| **Data / Parameter** | $GWP_{CH4}$ |
| **Data unit** | t $CO_2$e/t $CH_4$ |
| **Description** | Global warming potential for $CH_4$ |
| **Source of data** | IPCC Fourth Assessment Report, 100-year global warming potential derived<br>from the IPCC Fourth Assessment Report |
| **Value applied** | 28 |
| **Justification of choice of data or description of measurement methods and procedures applied** | IPCC Fourth Assessment Report, 100-year global warming potential derived<br>from the IPCC Fourth Assessment Report |
| **Purpose of Data** | Calculation of baseline and project emissions |
| **Comments** | N/A |

| | |
|---|---|
| **Data / Parameter** | GWP $N_2O$ |

| | |
|---|---|
| **Data unit** | t $CO_2$e/t $N_2O$ |
| **Description** | Global warming potential for $N_2O$ |
| **Source of data** | IPCC Fifth Assessment Report, 100-year global warming potential derived |
| **Value applied** | 265 |
| **Justification of choice of data or description of measurement methods and procedures applied** | Default value according to IPCC Fourth Assessment Report |
| **Purpose of Data** | Calculation of baseline and project emissions |
| **Comments** | N/A |

| | |
|---|---|
| **Data / Parameter** | EFNdirect |
| **Data unit** | t $N_2O$-N/t N applied |
| **Description** | Emission factor for direct nitrous oxide emissions from N additions from synthetic fertilizers, organic amendments and crop residues |
| **Source of data** | 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 11 Table 11.1 |
| **Value applied** | 0.01 |
| **Justification of choice of data or description of measurement methods and procedures applied** | Default value according to IPCC. |
| **Purpose of Data** | Calculation of baseline and project emissions |
| **Comments** | Emission factor applicable to N additions from mineral fertilizers, organic amendments and crop residues, and N mineralized from mineral soil as result of loss of soil carbon |

| | |
|---|---|
| **Data / Parameter** | FracGASF |
| **Data unit** | Dimensionless |
| **Description** | Fraction of all synthetic N added to soils that volatilizes as $NH_3$ and NOx |

| | |
|---|---|
| **Source of data** | 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 11 Table 11.3 |
| **Value applied** | 0.11 |
| **Justification of choice of data or description of measurement methods and procedures applied** | Default value according to IPCC Guidelines for National Greenhouse Gas Inventories |
| **Purpose of Data** | Calculation of baseline and project emissions |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | FracGASM |
| **Data unit** | Dimensionless) |
| **Description** | Fraction of all organic N added to soils and N in manure and urine deposited on soils that volatilizes as NH3 and NOx |
| **Source of data** | 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 11 Table 11.3 |
| **Value applied** | 0.21 |
| **Justification of choice of data or description of measurement methods and procedures applied** | Default value according to IPCC Guidelines for National Greenhouse Gas Inventories |
| **Purpose of Data** | Calculation of baseline and project emissions |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | EFNvolat |
| **Data unit** | t $N_2O$-N /(t $NH_3$-N + NOx-N volatilized) |
| **Description** | Emission factor for nitrous oxide emissions from atmospheric deposition of N on soils and water surfaces |
| **Source of data** | 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 11 Table 11.3 |

| | |
|---|---|
| **Value applied** | 0.01 |
| **Justification of choice of data or description of measurement methods and procedures applied** | Default value according to IPCC Guidelines for National Greenhouse Gas Inventories |
| **Purpose of Data** | Calculation of baseline and project emissions |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | FracLEACH |
| **Data unit** | Dimensionless |
| **Description** | Fraction of N added (synthetic or organic) to soils and N in manure and urine deposited on soils that is lost through leaching and runoff, in regions where leaching and runoff occurs |
| **Source of data** | 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 11 Table 11.3 |
| **Value applied** | For wet climates or in dry climate regions where irrigation (other than drip irrigation) is used, a value of 0.24 will be applied. For dry climates, a value of zero will be applied. |
| **Justification of choice of data or description of measurement methods and procedures applied** | Source and values of data determined by methodology. |
| **Purpose of Data** | Calculation of baseline and project emissions |
| **Comments** | Wet climates occur in temperate and boreal zones where the ratio of annual precipitation: potential evapotranspiration > 1. Dry climates occur in temperate and boreal zones where the ratio of annual precipitation: potential evapotranspiration < 1. |

| | |
|---|---|
| **Data / Parameter** | EFNleach |
| **Data unit** | t $N_2O$-N / t N leached and runoff |
| **Description** | Emission factor for nitrous oxide emissions from leaching and runoff |
| **Source of data** | 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 11 Table 11.3 |

| | |
|---|---|
| **Value applied** | 0.011 |
| **Justification of choice of data or description of measurement methods and procedures applied** | See source of data above |
| **Purpose of Data** | Calculation of baseline and project emissions |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Ncontent,g |
| **Data unit** | t N/t dm |
| **Description** | Fraction of N in dry matter for N-fixing species g |
| **Source of data** | 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 11 Table 11a |
| **Value applied** | The fraction of N in dry matter is determined based on the N-fixing species type.<br><br>Soybeans: 0.008 (aboveground); 0.008 (belowground) Alfalfa: 0.027 (aboveground); 0.019 (belowground)<br>Beans and pulses: 0.008 (aboveground); 0.008 (belowground)<br>Grass-clover mixtures: 0.025 (aboveground); 0.016 (belowground)<br>Generic values for crops not specified in Table 11.1: 0.008 (aboveground); 0.009 (belowground) |
| **Justification of choice of data or description of measurement methods and procedures applied** | Source of data is specified by the methodology. |
| **Purpose of Data** | Calculation of baseline and project emissions |
| **Comments** | Determined both for N content of above-ground residues and below-ground residues |

| | |
|---|---|
| **Data / Parameter** | Moisture_Content |
| **Data unit** | % |
| **Description** | Fraction of N in dry matter for N-fixing species g |

| | |
|---|---|
| **Source of data** | 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 11 Table 11a |
| **Value applied** | The fraction of N in dry matter is determined based on the N-fixing species type.<br><br>Soybeans: 0.008 (aboveground); 0.008 (belowground) Alfalfa: 0.027 (aboveground); 0.019 (belowground)<br>Beans and pulses: 0.008 (aboveground); 0.008 (belowground)<br>Grass-clover mixtures: 0.025 (aboveground); 0.016 (belowground)<br>Generic values for crops not specified in Table 11.1: 0.008 (aboveground); 0.009 (belowground) |
| **Justification of choice of data or description of measurement methods and procedures applied** | Source of data is specified by the methodology. |
| **Purpose of Data** | Calculation of baseline and project emissions |
| **Comments** | Determined both for N content of above-ground residues and below-ground residues |

| | |
|---|---|
| **Data / Parameter** | OrganicAmendment_CN_Ratio |
| **Data unit** | Ratio |
| **Description** | A carbon-to-nitrogen ratio (C/N ratio or C:N ratio), which is a ratio of the mass of carbon to the mass of nitrogen in organic residues in the baseline and/or project scenario |
| **Source of data** | COMET-Planner (http://comet-planner.com/, Swan et al. 2020 |
| **Value applied** | Multiply values |
| **Justification of choice of data or description of measurement methods and procedures applied** | |
| **Purpose of Data** | Modelling baseline and project emissions |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Mbsl,OF,i,t |
| **Data unit** | t fertilizer |

| | |
|---|---|
| **Description** | Mass of baseline N containing organic fertilizer applied for sample unit i in year t |
| **Source of data** | Box 1 of the VM0042 methodology |
| **Value applied** | Specific for each farmer |
| **Justification of choice of data or description of measurement** | Data is recorded by farmers in the farms data software, which calculates the amount of N applied based on the type of fertilizers applied and manufacture specifications regarding the N content in the type of fertilizer applied.<br><br>Alternatively, information is collected via direct consultation with, and substantiated with a written attestation from, the grower or landowner of the sample unit. Any quantitative information (e.g., discrete or continuous numeric variables) on agricultural management practices is supported by one or more forms of documented evidence pertaining to the selected sample unit and relevant monitoring period (e.g., management logs, receipts or invoices, farm equipment specifications). |
| **Purpose of Data** | Calculation of baseline emissions |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | $FSNbsl,i,$t |
| **Data unit** | t N |
| **Description** | Baseline synthetic N fertilizer applied for sample unit i in year t; t N |
| **Source of data** | Farmers records from the automatic data recording systems like MyJohnDeere / Climate |
| **Value applied** | Specific for each farmer |
| **Justification of choice of data or description of measurement** | Data is recorded by farmers in the farms data software, which calculates the amount of N applied based on the type of fertilizers applied and manufacture specifications regarding the N content in the type of fertilizer applied.<br><br>Alternatively, information is determined via direct consultation with, and substantiated with a written attestation from, the grower or landowner of the sample unit. Any quantitative information (e.g., discrete or continuous numeric variables) on agricultural management practices is supported by one or more forms of documented evidence pertaining to the selected sample unit and relevant monitoring period (e.g., management logs, receipts or invoices, farm equipment specifications). |
| **Purpose of data** | Calculation of baseline emissions |

| | |
|---|---|
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | NCbsl,OF,i,t |
| **Data unit** | t N/t fertilizer |
| **Description** | P N content of baseline organic fertilizer applied |
| **Source of data** | Peer-reviewed published data may be used. For example, default manure N contents may be selected from Edmonds et al. (2003) cited in U.S. Environmental Protection Agency. (2011). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009. EPA 430- R-11-005. Washington, D.C. or other regionally appropriate sources such as the European Environment Agency. |
| **Value applied** | Specific for each farmer |
| **Justification of choice of data or description of measurement** | Data is recorded by farmers in the farms data software, which calculates the amount of N applied based on the type of fertilizers applied and manufacture specifications regarding the N content in the type of fertilizer applied.<br><br>Alternatively, information is collected via direct consultation with, and substantiated with a written attestation from, the grower or landowner of the sample unit. Any quantitative information (e.g., discrete or continuous numeric variables) on agricultural management practices is supported by one or more forms of documented evidence pertaining to the selected sample unit and relevant monitoring period (e.g., management logs, receipts or invoices, farm equipment specifications). |
| **Purpose of data** | Calculation of baseline emissions |
| **Comments** | None |

| **Data / Parameter** | MBg,bsl,i,t |
|---|---|
| **Data unit** | t dm |
| **Description** | Annual dry matter, including aboveground and below ground, of N-fixing species g returned to soils for sample unit i at time t in the baseline scenario. |
| **Source of data** | 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 11 Table 11a. |
| **Value applied** | Specific for each farmer |
| **Justification of choice of data or description of measurement** | Calculated based on the above-mentioned IPCC Guideline, Table 11.2 for Above-ground residue dry matter definition and harvested dry matter yield calculation as per equation 11.7 based on the harvested fresh yield for each crop (monitored value) and dry matter fraction of harvested crop as per Table 11.1A. Estimation of total amount of belowground crop residue is based on the Equation 11.6 – total annual area harvested (monitored), fraction of total area under crop T that is renewed annually (1), ratio of below-ground root biomass to above-ground shoot biomass (default value from Table 11.1a), Above-ground residue dry matter and harvested annual dry matter yield calculated based on the equation 11.7.<br><br>The relevant ratios and constants for soybean, as well as potentially applicable N-fixing crops, are provided below. |

| | Dry matter fraction of harvested product | Ratio of aboveground residue dry matter to harvested yield | Ratio of belowground root biomass to aboveground shoot biomass |
|---|---|---|---|
| Soybeans | 0.91 | 2.1 | 0.19 |
| Beans and pulses | 0.91 | 2.1 | 0.19 |
| Alfalfa | 0.9 | 1.0 | 0.40 |
| Grass-clover mixture | 0.90 | 0.3 | 0.80 |
| Generic value for crops not indicated above | 0.85 | 1.0 | 0.22 |

| | |
|---|---|
| **Data / Parameter** | MBg,bsl,i,t |
| **Data unit** | t dm |
| **Description** | Annual dry matter, including aboveground and below ground, of N-fixing species g returned to soils for sample unit i at time t in the baseline scenario. |
| **Source of data** | 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 11 Table 11a. |
| **Value applied** | Specific for each farmer |
| | |
| **Purpose of data** | Calculation of baseline emissions |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | *Pbsl*,p |
| **Data unit** | Productivity (e.g., kg) per hectare or acre |
| **Description** | Average productivity for product p during the historical baseline period |
| **Source of data** | Information on yields/productivity provided by grower during enrollment |
| **Value applied** | Specific for each farmer |
| **Justification of choice of data or description of measurement** | Yield is measured using grower's locally available technologies such as commercial scales or storage volume measurements |
| **Purpose of data** | Determination of baseline productivity for market leakage analysis |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | *RPbsl*,p |
| **Data unit** | Productivity (e.g., kg) per hectare or acre |
| **Description** | Average regional productivity for product p during the same years as the historical baseline period |
| **Source of data** | Regional productivity data from government, industry, published, academic or international organization sources. E.g. USDA National Agricultural Statistics Service Quick Stats database, USDA National Agricultural Statistics Service Agricultural Census or Survey data. |

| | |
|---|---|
| **Value applied** | Defined during leakage analysis |
| **Justification of choice of data or description of measurement** | Average yield for each crop represented in the project's initial instance baseline periods is sourced for the years included in the baseline periods from the USDA National Agricultural Statistics Service Quick Stats database. https://quickstats.nass.usda.gov/ To determine the average regional productivity, annual average state yields is averaged across all states and years included |
| **Purpose of data** | Determination of baseline productivity ratio for future market leakage analysis |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | $FON_{bsl,i,t}$ |
| **Data unit** | t N |
| **Description** | Baseline organic N fertilizer applied for sample unit i in year t; t N |
| **Source of data** | Farmers records from the automatic data recording systems like MyJohnDeere / Climate |
| **Value applied** | Specific for each farmer |
| **Justification of choice of data or description of measurement** | Data is recorded by farmers in the farms data software, which calculates the amount of N applied based on the type of fertilizers applied and manufacture specifications regarding the N content in the type of fertilizer applied.<br><br>Alternatively, information is determined via direct consultation with, and substantiated with a written attestation from, the grower or landowner of the sample unit. The quantitative information is supported by one or more forms of documented evidence pertaining to the selected sample unit and relevant monitoring period. |
| **Purpose of data** | Calculation of baseline emissions |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Crop_type,bsl |
| **Data unit** | Categorical value |
| **Description** | Type of crop planted by the grower in the baseline scenario |
| **Source of data** | Determined in sample unit i from grower management practice information on agricultural activities.<br>Data sourcing is conducted according to Box 1 in VM0042 based e.g. on the |

| | |
|---|---|
| | 1) planting/harvest maps 2) USDA CroplandCROS crop type layer https://croplandcros.scinet.usda.gov/ - for the year prior to the actual 3) satellite imagery, invoices 4) self-attestation from the farmers |
| **Value applied** | Specific for each farmer |
| **Justification of choice of data or description of measurement and procedures to be applied** | Grower attestation and/or farm management records are sourced according to Box 1 in VM0042.<br>Crop type is determined prior to verification. |
| **Purpose of data** | Calculation of baseline emissions |
| **Comments** | None |

## 5.2 Data and Parameters Monitored

| | |
|---|---|
| **Data / Parameter** | AR |
| **Data unit** | Percent |
| **Description** | Weighted average adoption rate |
| **Source of data** | Project instance intended project activity adoption data |
| **Description of measurement methods and procedures to be applied** | Calculated value according to equation 1 of the applied methodology |
| **Frequency of monitoring/recording** | Each verification, when new instances are added |
| **Value applied** | N/A, will be calculated for new project instances joining the project |
| **Monitoring equipment** | N/A, calculated value |
| **QA/QC procedures to be applied** | N/A, calculated value – equation 1 of the methodology. Calculated based on the area of proposed project-level adoption of each activity and adoption rates in USA states |
| **Purpose of Data** | Assessment of the common practice |

| | |
|---|---|
| **Calculation method** | Calculated value according to equation 1 of the applied methodology |
| **Comments** | N/A |

| | |
|---|---|
| **Data / Parameter** | $Area_{an}$ |
| **Data unit** | Acres |
| **Description** | Area of proposed project-level adoption of each activity |
| **Source of data** | Project records |
| **Description of measurement methods and procedures to be applied** | The area is estimated during each verification |
| **Frequency of monitoring/recording** | Once during each verification event |
| **Value applied** | Can not be determined ex-ante, monitored value for each USA state and practice / mix of practices |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | Cross-check with GIS/remote sensing data. Area of fields adopting new practices is determined from shapefiles for field boundaries of new project instances enrolled in the project. Field boundaries are checked and adjusted as needed by Agoto to ensure that a consistent coordinate reference system and projection are used and only eligible acres are included. |
| **Purpose of data** | Common practice assessment |
| **Calculation method** | Calculation based on the projects records - based on the values specified in contracts with farmers (SalesForce). |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | $EA_{an}$ |
| **Data unit** | Percent |
| **Description** | Adoption rate of the n largest most common proposed project activity in each USA states where farmers are enrolled |
| **Source of data** | Soil Enrichment protocol (SEP), Additionality tool, available at https://www.climateactionreserve.org/how/protocols/soil-enrichment/ or other suitable recognized data source |

| | |
|---|---|
| Description of measurement methods and procedures to be applied | N/A |
| Frequency of monitoring/recording | Whenever new instances are added |
| Value applied | N/A |
| Monitoring equipment | N/A |
| QA/QC procedures to be applied | N/A |
| Purpose of data | Common practice assessment |
| Calculation method | N/A |
| Comments | None |

| Data / Parameter | $A_0$ |
|---|---|
| Data unit | Unit area, acres |
| Description | Total project area |
| Source of data | Measured in project area using shapefiles of enrolled field (project instance) boundaries. |
| Description of measurement methods and procedures to be applied | Calculated value |
| Frequency of monitoring/recording | One time during each verification event |
| Value applied | N/A as new fields will be added on continuous basis and fixed area cannot be estimated ex-ante |
| Monitoring equipment | N/A |
| QA/QC procedures to be applied | Calculation based on the projects records - based on the values specified in contracts with farmers (from SalesForce). *Cross-check with GIS/remote sensing data.* |

| | |
|---|---|
| | Delineation of the project area will be also conducted using GIS data (shapefiles) All shapefiles will be transformed to the same coordinate reference system and projection and reviewed by Agoro to ensure only eligible acres are included. Non-eligible acres including trees, ponds, ditch infrastructure, and barns or other buildings were excluded. |
| **Purpose of data** | Calculation of baseline and project emissions |
| **Calculation method** | Calculation method- calculation based on the projects records - based on the values specified in contracts with the farmers (SalesForce) |
| **Comments** | N/A |

| | |
|---|---|
| **Data / Parameter** | Ai |
| **Data unit** | Unit area |
| **Description** | Area of sample unit i |
| **Source of data** | Determined in project area |
| **Description of measurement methods and procedures to be applied** | The sample unit area is measured prior to verification |
| **Frequency of monitoring/recording** | At least every five years, or prior to each verification event if less than five years |
| **Value applied** | This value will change over time since this is a grouped project |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | Delineation of the sample unit area may use a combination of GIS coverages, ground survey data, remote imagery (satellite or aerial photographs), or other appropriate data. Any imagery or GIS datasets used will be geo-registered referencing corner points, clear landmarks or other intersection points. |
| **Purpose of data** | Calculation of baseline and project emissions |
| **Calculation method** | Not applicable |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | i |

| | |
|---|---|
| **Data unit** | dimensionless |
| **Description** | Sample unit; defined area that is selected for measurement and monitoring, such as a field |
| **Source of data** | Determined in project area based on biophysical and soil characteristics of project instance locations, historical management activities, and planned project activities |
| **Description of measurement methods and procedures to be applied** | The sample unit is determined prior to verification. The sample unit is not determined through measurement. See section 5.3 for additional details on determination of sample units. |
| **Frequency of monitoring/recording** | Monitoring must be conducted at least every five years, or prior to each verification even if less than five years |
| **Value applied** | N/A, the sample unit does not have a measured value. |
| **Monitoring equipment** | N/A, not monitored using equipment |
| **QA/QC procedures to be applied** | Delineation of the sample unit will use a combination of GIS coverages, remote imagery, and other appropriate data. All imagery and GIS datasets used will be appropriately georegistered. |
| **Purpose of data** | Calculation of baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | $FSN_{wp,i,t}$ |
| **Data unit** | t N |
| **Description** | Project synthetic N fertilizer applied for sample unit i in year t; t N |
| **Source of data** | Farmers records from the automatic data recording systems like MyJohnDeere / Climate |
| **Description of measurement methods and procedures to be applied** | Data is recorded by farmers in the farms data software, which calculates the amount of N applied based on the type of fertilizers applied and manufacture specifications regarding the N content in the type of fertilizer applied.<br>N content of different fertilizer types is fixed according to the chemical composition of the fertilizer and derived based on the fertilizer's chemical formula.<br><br>Alternatively, information will be monitored via direct consultation with, and substantiated with a written attestation from, the grower or landowner of the sample unit. The quantitative information will |

| | |
|---|---|
| | be supported by one or more forms of documented evidence pertaining to the selected sample unit and relevant monitoring period. |
| **Frequency of monitoring/recording** | At least every five years, or prior to each verification event if less than five years |
| **Value applied** | N/A, can not be identified ex-ante, will be defined during the monitoring stage |
| **Monitoring equipment** | None |
| **QA/QC procedures to be applied** | Project agronomists will review the data and assure the plausibility of the data based on the cross-check of the monitored values with the data from the literature and/or based on their knowledge for specific crops planted. |
| **Purpose of data** | Calculation of project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | $F$ONwp,$i$,t |
| **Data unit** | t N |
| **Description** | Project organic N fertilizer applied for sample unit i in year t; t N |
| **Source of data** | Farmers records from the automatic data recording systems like MyJohnDeere / Climate |
| **Description of measurement methods and procedures to be applied** | Data is recorded by farmers in the farms data software, which calculates the amount of N applied based on the type of fertilizers applied and manufacture specifications regarding the N content in the type of fertilizer applied.<br><br>Alternatively, information will be monitored via direct consultation with, and substantiated with a written attestation from, the grower or landowner of the sample unit. Any quantitative information (e.g., discrete or continuous numeric variables) on agricultural management practices will be supported by one or more forms of documented evidence pertaining to the selected sample unit and relevant monitoring period (e.g., management logs, receipts or invoices, farm equipment specifications). |
| **Frequency of monitoring/recording** | At least every five years, or prior to each verification event if less than five years |
| **Value applied** | N/A, can not be identified ex-ante, will be defined during the monitoring stage |
| **Monitoring equipment** | None |

| | |
|---|---|
| **QA/QC procedures to be applied** | Project agronomists will review the data and assure the plausibility of the data based on the cross-check of the monitored values with the data from the literature and/or based on their knowledge for specific crops planted. |
| **Purpose of data** | Calculation of project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Mwp,OF,i,t |
| **Data unit** | t fertilizer |
| **Description** | Mass of N containing organic fertilizer applied in the project for sample unit i in year t |
| **Source of data** | Box 1 of the VM0042 methodology |
| **Description of measurement methods and procedures to be applied** | Data is recorded by farmers in the farms data software, which calculates the amount of N applied based on the type of fertilizers applied and manufacture specifications regarding the N content in the type of fertilizer applied.<br><br>Alternatively, information will be monitored via direct consultation with, and substantiated with a written attestation from, the grower or landowner of the sample unit. Any quantitative information (e.g., discrete or continuous numeric variables) on agricultural management practices will be supported by one or more forms of documented evidence pertaining to the selected sample unit and relevant monitoring period (e.g., management logs, receipts or invoices, farm equipment specifications). |
| **Frequency of monitoring/recording** | Monitoring will be conducted at least every five years, or prior to each verification event if less than five years |
| **Value applied** | N/A, can not be identified ex-ante, will be defined during the monitoring stage |
| **Monitoring equipment** | None |
| **QA/QC procedures to be applied** | Information will be monitored via direct consultation with, and substantiated with a written attestation from, the farmer or landowner of the sample unit. Any quantitative information (e.g., discrete or continuous numeric variables) on agricultural management practices will be supported by one or more forms of documented evidence pertaining to the selected sample unit and relevant monitoring period (e.g., management logs, receipts or invoices, farm equipment specifications). |
| **Purpose of data** | Calculation of project emissions |

| | |
|---|---|
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Manure_Source |
| **Data unit** | Categorical value |
| **Description** | Source of organic fertiliser/manure applied, e.g. pig, cow manure |
| **Source of data** | Box 1 of the VM0042 methodology |
| **Description of measurement methods and procedures to be applied** | Data is recorded by farmers.<br><br>Alternatively, information will be monitored via direct consultation with, and substantiated with a written attestation from, the grower or landowner of the sample unit. The information will be supported by one or more forms of documented evidence pertaining to the selected sample unit and relevant monitoring period (e.g., management logs, receipts or invoices). |
| **Frequency of monitoring/recording** | Monitoring will be conducted at least every five years, or prior to each verification event if less than five years |
| **Value applied** | N/A, can not be identified ex-ante, will be defined during the monitoring stage |
| **Monitoring equipment** | None |
| **QA/QC procedures to be applied** | None |
| **Purpose of data** | Calculation of baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Manure_Type |
| **Data unit** | Categorical value |
| **Description** | Type of organic fertiliser/manure applied, e.g. liquid manure |
| **Source of data** | Box 1 of the VM0042 methodology |
| **Description of measurement methods** | Data is recorded by farmers. |

| | |
|---|---|
| **and procedures to be applied** | Alternatively, information will be monitored via direct consultation with, and substantiated with a written attestation from, the grower or landowner of the sample unit. The information will be supported by one or more forms of documented evidence pertaining to the selected sample unit and relevant monitoring period (e.g., management logs, receipts or invoices). |
| **Frequency of monitoring/recording** | Monitoring will be conducted at least every five years, or prior to each verification event if less than five years |
| **Value applied** | N/A, can not be identified ex-ante, will be defined during the monitoring stage |
| **Monitoring equipment** | None |
| **QA/QC procedures to be applied** | None |
| **Purpose of data** | Calculation of baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | $Pwp$,p |
| **Data unit** | Productivity (e.g., kg or bushel) per hectare or acre |
| **Description** | Average productivity for product p during the project period |
| **Source of data** | Farm productivity (e.g., yield) records |
| **Description of measurement methods and procedures to be applied** | Yield will be measured using grower's locally available technologies such as commercial scales or storage volume measurements. |
| **Frequency of monitoring/recording** | Yields must be measured each growing season. The average productivity for a specific crop will be calculated for the project period between leakage calculation events at each leakage calculation event, which occur every 10 years. |
| **Value applied** | Value cannot be estimated in advance as yields will vary by grower depending on practices, weather, etc. year over year. |
| **Monitoring equipment** | N/A, not monitored using equipment |
| **QA/QC procedures to be applied** | Agoro Carbon will follow the requirements of Box 1 and the procedures in Appendix 6.7 regarding appropriate sources of qualitative and quantitative data on grower agricultural management practices implemented each year. |

| | |
|---|---|
| **Purpose of data** | Determination of project productivity for market leakage analysis |
| **Calculation method** | Not applicable, not calculated |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | g |
| **Data unit** | Dimensionless |
| **Description** | Type of N-fixing species |
| **Source of data** | Determined in sample unit i from grower management practice information on cropping activities |
| **Description of measurement methods and procedures to be applied** | Grower attestation and/or farm management records will be sourced according to Box 1 in VM0042. N-fixing species type is determined prior to verification. |
| **Frequency of monitoring/recording** | At least every five years, or prior to each verification event if less than five years. |
| **Value applied** | Various N-fixing species such as soybean, clover, vetch, or other leguminous cover crops. |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | Agoro will follow the requirements of Box 1 and the procedures in Appendix 6.7 regarding appropriate sources of qualitative and quantitative data on grower agricultural management practices implemented each year. |
| **Purpose of data** | Calculation of baseline and project emissions. |
| **Calculation method** | Not applicable |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | • |
| **Data unit** | Dimensionless |
| **Description** | Gas or pool |
| **Source of data** | Determined in sample unit i |
| **Description of measurement methods** | Not applicable |

| | |
|---|---|
| and procedures to be applied | |
| Frequency of monitoring/recording | At least every five years, or prior to each verification event if less than five years |
| Value applied | N/A, can not be identified ex-ante, will be defined during the monitoring stage |
| Monitoring equipment | N/A |
| QA/QC procedures to be applied | Not applicable |
| Purpose of data | Calculation of baseline and project emissions |
| Calculation method | Not applicable |
| Comments | None |

| | |
|---|---|
| Data / Parameter | SF |
| Data unit | Dimensionless |
| Description | Type of synthetic N fertilizer |
| Source of data | Determined in sample unit i from grower management practice information provided on fertilizer use |
| Description of measurement methods and procedures to be applied | Grower attestation and/or farm management records will be sourced according to Box 1 in VM0042. Synthetic fertilizer type is determined prior to verification. |
| Frequency of monitoring/recording | Monitoring must be conducted at least every five years, or prior to each verification event if less than five years. The value of this parameter will be recorded annually. |
| Value applied | N/A, can not be identified ex-ante, will be defined during the monitoring stage |
| Monitoring equipment | N/A |
| QA/QC procedures to be applied | Agoro Carbon will follow the requirements of Box 1 and the procedures in Appendix 6.7 regarding appropriate sources of qualitative and quantitative data on grower agricultural management practices implemented each year. |
| Purpose of data | Calculation of baseline and project emissions |
| Calculation method | Not applicable |
| Comments | None |

| | |
|---|---|
| **Data / Parameter** | OF |
| **Data unit** | Dimensionless |
| **Description** | Type of organic N fertilizer |
| **Source of data** | Determined in sample unit i from grower management practice information provided on fertilizer use |
| **Description of measurement methods and procedures to be applied** | Grower attestation and/or farm management records will be sourced according to Box 1 in VM0042. Organic fertilizer type is determined prior to verification. |
| **Frequency of monitoring/recording** | Monitoring must be conducted at least every five years, or prior to each verification event if less than five years. The value of this parameter will be recorded annually. |
| **Value applied** | N/A, can not be identified ex-ante, will be defined during the monitoring stage |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | Agoro will follow the requirements of Box 1 and the procedures in Appendix 6.7 regarding appropriate sources of qualitative and quantitative data on grower agricultural management practices implemented each year. |
| **Purpose of data** | Calculation of baseline and project emissions |
| **Calculation method** | Not applicable |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | SOCbsl,i,t |
| **Data unit** | t $CO_2$e/unit area |
| **Description** | Areal-average soil organic carbon stocks in the baseline scenario for sample unit i in year t |
| **Source of data** | Modelled in the project area – DayCent |
| **Description of measurement methods and procedures to be applied** | Modelled soil organic carbon stocks in the baseline scenario are determined according to the equation: $$SOC_{bsl,i,t} = f_{soc}(Var\ A_{bsl,i,t},\ Var\ B_{bsl,i,t},...)$$ <table><tr><td>$SOC\ bsl,i,t$</td><td>Modelled soil organic carbon stocks pool in the baseline</td></tr></table> |

| | |
|---|---|
| | scenario for sample unit i at time t (t $CO_2$ e/unit area) |
| *f s*oc | Model predicting carbon dioxide emissions from the soil organic carbon pool (t $CO_2$ e/unit area) |
| *Var A bsl*,*i*,t | Value of model input variable A in the baseline scenario for sample unit i at time t (units unspecified) |
| *Var Bbsl*,*i*,t | Value of model input variable B in the baseline scenario for sample unit i at time t (units unspecified) |

Model input variables will be sourced according to Box 1 in VM0042.

| | |
|---|---|
| **Frequency of monitoring/recording** | At least every five years, or prior to each verification event if less than five years |
| **Value applied** | N/A, can not be identified ex-ante, will be defined during the monitoring stage |
| **Monitoring equipment** | Modelling will be done with the DAYCENT model |
| **QA/QC procedures to be applied** | Agoro Carbon will follow the requirements of Box 1 regarding appropriate sources of qualitative and quantitative data on grower agricultural management practices implemented each year, used to establish model input variables. |
| **Purpose of data** | Calculation of baseline emissions. |
| **Calculation method** | Not applicable |
| **Comments** | The soil organic carbon stocks at time t=0 are directly measured at t=0 or (back-) modelled to t =0 from measurements collected within +/-5 years of t =0, or determined for t=0 via emerging technologies (e.g., remote sensing) with known uncertainty, and must be used in both the baseline and with- project scenario for the length of the project. |

| | |
|---|---|
| **Data / Parameter** | SOCbsl,i,t-1 |
| **Data unit** | t $CO_2$e/unit area |
| **Description** | Areal-average soil organic carbon stocks in the baseline scenario for sample unit i in year t-1 |
| **Source of data** | Modelled in the project area |
| **Description of measurement methods** | See *fSOC*bsl,i,t above |

| | |
|---|---|
| **and procedures to be applied** | |
| **Frequency of monitoring/recording** | At least every five years, or prior to each verification event if less than five years |
| **Value applied** | N/A, can not be identified ex-ante, will be defined during the monitoring stage |
| **Monitoring equipment** | Modelling will be done with the Daycent model |
| **QA/QC procedures to be applied** | Modelling is based on grower-provided management information and baseline soil samples. Agoro Carbon will follow the requirements of Box 1 and the procedures in Appendix 6.7 regarding appropriate sources of qualitative and quantitative data on grower agricultural management practices implemented each year. Agoro Carbon will implement soil sampling standard operating procedures described in the updated version of VM0042 to ensure high quality soil samples. |
| **Purpose of data** | Calculation of baseline emissions. |
| **Calculation method** | Not applicable |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | SOCwp,i,t |
| **Data unit** | t $CO_2$e/unit area |
| **Description** | Areal-average soil organic carbon stocks in the project scenario for sample unit i in year t |
| **Source of data** | Modelled in the project area |
| **Description of measurement methods and procedures to be applied** | Modelled soil organic carbon stocks in the project scenario are determined according to the equation: $$SOC_{wp,i,t} = f_{soc}(Var\ A_{wp,i,t},\ Var\ B_{wp,i,t},...)$$ Where<br><table><tr><td>$SOC\ wp,i$,t</td><td>Modelled soil organic carbon stocks pool in the project scenario for sample unit i at time t (t CO 2 e/unit area)</td></tr><tr><td>$f\ s$oc</td><td>Model predicting carbon dioxide emissions from the soil organic carbon pool (t CO 2 e/unit area)</td></tr></table> |

| | |
|---|---|
| | <table><tr><td>$Var\ A$ wp,$i$,t</td><td>Value of model input variable A in the project scenario for sample unit i at time t (units unspecified)</td></tr><tr><td>$Var\ B$wp,$i$,t</td><td>Value of model input variable B in the project scenario for sample unit i at time t (units unspecified)</td></tr></table><br><br>Model input variables will be sourced according to Box 1 in VM0042.<br><br>All organic material (e.g., living plants, crop residue) will be cleared from the soil surface prior to soil sampling. Soil will be sampled to a minimum depth of 30 cm.<br>Soil organic carbon stocks will be estimated from measurements of both soil organic carbon content and bulk density taken at the same time, at the project start and re-measured every 5 years or less.<br>Geographic locations of intended sampling points will be established prior to sampling. The location of both the intended sampling point and the actual sampling point will be recorded.<br>If multiple cores are composited to create a single sample, these cores must all be from the same depth and be fully homogenized prior to subsampling.<br>Soils will be shipped within 5 days of collection and should be kept cool until shipping. |
| **Frequency of monitoring/recording** | At least every five years, or prior to each verification event if less than five years |
| **Value applied** | N/A - variable with time |
| **Monitoring equipment** | Modelling will be done with the DAYCENT model |
| **QA/QC procedures to be applied** | Agoro will follow the requirements of Box 1 regarding appropriate sources of qualitative and quantitative data on grower agricultural management practices implemented each year, used to establish model input variables.<br>Standard QA/QC procedures for soil inventory including field data collection and data management will be applied.<br><br>Soils will be cleared of all organic matter at the surface prior to sampling. Samples will be collected to a minimum depth of 30 cm, ideally as contiguous cores divided into shorter increments. Bulk density measurements will not include the mass of large particles, stones, or plant material. Samples will be shipped to the lab within five days of collection. Dry combustion will be used to measure SOC. |

| | |
|---|---|
| **Purpose of data** | Calculation of project emissions. |
| **Calculation method** | Not applicable |
| **Comments** | The soil organic carbon stocks at time t=0 are directly measured at t=0 or (back-) modelled to t =0 from measurements collected within +/-5 years of t=0, or determined for t=0 via emerging technologies (e.g., remote sensing) with known uncertainty, and must be used in both the baseline and with- project scenario for the length of the project. Soil organic carbon stocks in the project scenario for sample unit i must be reported every 5 years or less. Where re-measurement of soil organic carbon stocks indicates lower stocks than previously estimated by modelling, procedures in the most current version of the VCS Registration and Issuance Process for loss or reversal events are followed, as appropriate. |

| | |
|---|---|
| **Data / Parameter** | SOCwp,i,t-1 |
| **Data unit** | t $CO_2$e/unit area |
| **Description** | Areal-average soil organic carbon stocks in the project scenario for sample unit i in year t-1 |
| **Source of data** | Modelled in the project area |
| **Description of measurement methods and procedures to be applied** | See SOCwp,i,t above. |
| **Frequency of monitoring/recording** | At least every five years, or prior to each verification event if less than five years |
| **Value applied** | N/A - variable with time |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | See SOCwp,i,t above. |
| **Purpose of data** | Calculation of project emissions. |
| **Calculation method** | Not applicable |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | ƒ$CH_4$soilbsl,i,t |

| | |
|---|---|
| **Data unit** | t $CO_2$e/unit area |
| **Description** | Modelled methane emissions from the soil organic carbon pool in the baseline scenario for sample unit i at time t |
| **Source of data** | Modelled in the project area. |
| **Description of measurement methods and procedures to be applied** | Modelled soil organic carbon stocks in the baseline scenario are determined according to the equation:<br>$$ƒCH4soil_{bsl,i,t} = ʃ_{CH4soil}(Var\ A_{bsl,i,t}, Var\ B_{bsl,i,t}, \ldots)$$<br>Where<br>$ƒCH_4soilbsl,i,t$ = Modelled methane emissions from the soil organic carbon pool in the baseline scenario for sample unit i at time t (t $CH_4$/unit area)<br><br>$ʃCH_4soil$ = Model predicting methane emissions from the soil organic carbon pool<br><br>Var Absl,i,t = Value of model input variable A in the project scenario for sample unit i at time t (units unspecified)<br><br>Var Bbsl,i,t = Value of model input variable B in the project scenario for sample unit i at time t (units unspecified)<br><br>See Box 1 of the methodology for sources of data and description of measurement methods and procedures to be applied to obtain values for model input variables. |
| **Frequency of monitoring/recording** | At least every five years, or prior to each verification event if less than five years. |
| **Value applied** | N/A |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | Standard QA/QC procedures for soil inventory including field data collection and data management will be applied. |
| **Purpose of data** | Calculation of baseline emissions |
| **Calculation method** | Not applicable |
| **Comments** | The soil organic carbon stocks at time t=0 are directly measured at t=0 or (back-) modelled to t =0 from measurements collected within +/-5 years of t =0, or determined for t=0 via emerging |

| | |
|---|---|
| | technologies (e.g., remote sensing) with known uncertainty, and must be used in both the baseline and with- project scenario for the length of the project. |

| | |
|---|---|
| **Data / Parameter** | $f N_2Osoilbsl,i,t$ |
| **Data unit** | t $N_2O$/unit area |
| **Description** | Modelled nitrous oxide emissions from soil in the baseline scenario for sample unit i at time t |
| **Source of data** | Modelled in the project area |
| **Description of measurement methods and procedures to be applied** | Modelled nitrous oxide emissions from soil in the baseline scenario are determined according to the equation: $$fN2Osoil_{bsl,i,t} = f_{N2Osoil}(Var\ A_{bsl,i,t}, Var\ B_{bsl,i,t}, \ldots)$$ Where<br><br>$f N_2Osoilbsl,i,t$ = Modelled nitrous oxide emissions from soil in the baseline scenario for sample unit i at time t (t $CH_4$/unit area)<br><br>$f N_2Osoil$ = Model predicting methane emissions from the soil organic carbon pool<br><br>Var Absl,i,t = Value of model input variable A in the project scenario for sample unit i at time t (units unspecified)<br><br>Var Bbsl,i,t = Value of model input variable B in the project scenario for sample unit i at time t (units unspecified)<br><br>See Box 1 for sources of data and description of measurement methods and procedures to be applied to obtain values for model input variables. |
| **Frequency of monitoring/recording** | At least every five years, or prior to each verification event if less than five years |
| **Value applied** | N/A |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | Standard QA/QC procedures for soil inventory including field data collection and data management will be applied. |
| **Purpose of data** | Calculation of baseline emissions |

| | |
|---|---|
| **Calculation method** | Not applicable |
| **Comments** | The soil organic carbon stocks at time t=0 are directly measured at t=0 or (back-) modelled to t =0 from measurements collected within +/-5 years of t =0, or determined for t=0 via emerging technologies (e.g., remote sensing) with known uncertainty, and must be used in both the baseline and with- project scenario for the length of the project. |

| | |
|---|---|
| **Data / Parameter** | $\overline{\Delta} \bullet, t$ and $\overline{\bullet}$t |
| **Data unit** | t $CO_2$e/unit area |
| **Description** | Average emission reductions from pool or source •, or stock of pool •, in year t |
| **Source of data** | Calculated from modelled and calculated values in the project area |
| **Description of measurement methods and procedures to be applied** | Not applicable |
| **Frequency of monitoring/recording** | At least every five years, or prior to each verification event if less than five years |
| **Value applied** | N/A, will be calculated |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | None |
| **Purpose of data** | Calculation of emission reductions |
| **Calculation method** | The average emission reductions from pool or source •, or stock of pool •, at time t are estimated using unbiased statistical approaches |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | MBg,wp,i,t |
| **Data unit** | t dm |
| **Description** | Annual dry matter, including aboveground and below ground, of N-fixing species g returned to soils for sample unit i at time t in the project scenario. |

| | |
|---|---|
| **Source of data** | 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 11 Table 11a. |
| **Description of measurement methods and procedures to be applied** | Calculated based on the above-mentioned IPCC Guideline, Table 11.2 for Above-ground residue dry matter definition and harvested dry matter yield calculation as per equation 11.7 based on the harvested fresh yield for each crop (monitored value) and dry matter fraction of harvested crop as per Table 11.1A. Estimation of total amount of belowground crop residue is based on the Equation 11.6 – total annual area harvested (monitored), fraction of total area under crop T that is renewed annually (1), ratio of below-ground root biomass to above-ground shoot biomass (default value from Table 11.1a), Above-ground residue dry matter and harvested annual dry matter yield calculated based on the equation 11.7.<br>The relevant ratios and constants for soybean, as well as potentially applicable N-fixing crops, are provided below. |

| | Dry matter fraction of harvested product | Ratio of aboveground residue dry matter to harvested yield | Ratio of belowground root biomass to aboveground shoot biomass |
|---|---|---|---|
| Soybeans | 0.91 | 2.1 | 0.19 |
| Beans and pulses | 0.91 | 2.1 | 0.19 |
| Alfalfa | 0.9 | 1.0 | 0.40 |
| Grass-clover mixture | 0.90 | 0.3 | 0.80 |
| Generic value for crops not indicated above | 0.85 | 1.0 | 0.22 |

| | |
|---|---|
| **Frequency of monitoring/recording** | Annually |
| **Value applied** | This value cannot be estimated in advance as it will depend on each individual grower’s agricultural operations in a given year. |
| **Monitoring equipment** | N/A |

| | |
|---|---|
| **QA/QC procedures to be applied** | None |
| **Purpose of data** | Calculation of project emissions |
| **Calculation method** | Not applicable |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | p |
| **Data unit** | Categorical variable |
| **Description** | Crop product |
| **Source of data** | Farm productivity (e.g., yield) records |
| **Description of measurement methods and procedures to be applied** | N/A, not measured |
| **Frequency of monitoring/recording** | Crop grown must be recorded every growing season. Market leakage analysis will be conducted every 10 years. |
| **Value applied** | Value cannot be estimated in advance as crop grown may vary from grower to grower and year to year depending on weather, market forces, and other agricultural management considerations. Most likely, crop products grown will continue to include corn, soy, and wheat. |
| **Monitoring equipment** | N/A, not monitored using equipment |
| **QA/QC procedures to be applied** | Agoro Carbon will follow the requirements of Box 1 and the procedures in Appendix 6.7 regarding appropriate sources of qualitative and quantitative data on grower agricultural management practices implemented each year. |
| **Purpose of data** | Identification of crop product for market leakage analysis |
| **Calculation method** | N/A, categorical variable |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | $RPwp$,p |
| **Data unit** | Productivity (e.g., kg) per hectare or acre |

| | |
|---|---|
| **Description** | Average regional productivity for product p during the same years as the project period. |
| **Source of data** | Regional productivity data from government, industry, published, academic or international organization sources. E.g. USDA National Agricultural Statistics Service Quick Stats database, USDA National Agricultural Statistics Service Agricultural Census or Survey data. |
| **Description of measurement methods and procedures to be applied** | Average yield for each crop represented in the project's initial instance project periods will be sourced for the years included in the baseline periods from the USDA National Agricultural Statistics Service Quick Stats database. https://quickstats.nass.usda.gov/. To determine the average regional productivity, annual average state yields will be averaged across all states and years included. |
| **Frequency of monitoring/recording** | Market leakage analysis will be conducted every 10 years. |
| **Value applied** | Not applicable, value cannot be estimated in advance. |
| **Monitoring equipment** | N/A, not monitored using equipment |
| **QA/QC procedures to be applied** | Not applicable |
| **Purpose of data** | Determination of project productivity ratio for market leakage analysis |
| **Calculation method** | Depends on data source but likely will be calculated by averaging the annual average yield for a given crop in each state containing project instances across all included states and all years of the project period. |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Buffer,t |
| **Data unit** | $tCO_2e$ |
| **Description** | Number of buffer credits to be contributed to the AFOLU pooled buffer account in year t |
| **Source of data** | The number of buffer credits to be contributed to the AFOLU pooled buffer account must be determined by applying the latest version of the VCS AFOLU Non-Permanence Risk Tool. |

| | |
|---|---|
| **Description of measurement methods and procedures to be applied** | Not applicable |
| **Frequency of monitoring/recording** | Monitoring will be conducted at least every five years, or prior to each verification event if less than five years |
| **Value applied** | Buffer contribution is likely to be approximately 20%. Amount of $tCO_2e$ contributed to the buffer pool cannot be determined in advance. |
| **Monitoring equipment** | N/A, not monitored using equipment |
| **QA/QC procedures to be applied** | The number of buffer credits to be contributed to the AFOLU pooled buffer account must be determined by applying the latest version of the VCS AFOLU Non-Permanence Risk Tool |
| **Purpose of data** | Calculation of net greenhouse gas emission reductions and removals |
| **Calculation method** | The number of buffer credits to be contributed to the AFOLU pooled buffer account must be determined by applying the latest version of the VCS AFOLU Non-Permanence Risk Tool |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Crop_Type,wp |
| **Data unit** | Categorical value |
| **Description** | Type of crop planted by the grower in the project scenario |
| **Source of data** | Determined in sample unit i from grower management practice information on agricultural activities.<br><br>Data sourcing will be conducted according to Box 1 in VM0042 based e.g. on the<br><br>1) planting/harvest maps 2) satellite imagery, invoices 3) self-attestation from the farmers |
| **Description of measurement methods and procedures to be applied** | Grower attestation and/or farm management records will be sourced according to Box 1 in VM0042. Crop type is determined prior to verification. |

| | |
|---|---|
| **Frequency of monitoring/recording** | Monitoring will be conducted for each growing season. |
| **Value applied** | N/A, as it cannot be estimated ex-ante, and will be determined during the monitoring stage. |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | Agoro will follow the requirements of Box 1 and the procedures in Appendix 6.7 regarding appropriate sources of qualitative and quantitative data on grower agricultural management practices implemented each year. |
| **Purpose of data** | Calculation of project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

## Specific parameters needed only for the Quantification Approach 1 (modelling) of GHG emissions

| | |
|---|---|
| **Data / Parameter** | CC_type |
| **Data unit** | Categorical value |
| **Description** | Cover Crop species type in the baseline and/or project scenario |
| **Source of data** | Data sourcing will be conducted according to Box 1 in VM0042 |
| **Description of measurement methods and procedures to be applied** | Determined in sample unit i from grower management practice information on agricultural activities. |
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower applying cover crop(s) |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | Modelling baseline and project emissions |

| | |
|---|---|
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | CC Planting_Date |
| **Data unit** | Date in MM/DD/YYYY format |
| **Description** | Date of the crop planting in the baseline and/or project scenario |
| **Source of data** | Data sourcing will be conducted according to Box 1 in VM0042 |
| **Description of measurement methods and procedures to be applied** | Determined in sample unit i from grower management practice information on agricultural activities. |
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower applying cover crop(s) |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | Modelling baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | CC TerminateDate |
| **Data unit** | Date in MM/DD/YYYY format |
| **Description** | Cover Crop termination date in the baseline and/or project scenario |
| **Source of data** | Data sourcing will be conducted according to Box 1 in VM0042 |
| **Description of measurement methods and procedures to be applied** | Determined in sample unit i from grower management practice information on agricultural activities. |

| | |
|---|---|
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower applying cover crop(s) |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | Modelling baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | CC_Termination_Method |
| **Data unit** | Categorical value |
| **Description** | Cover Crop termination method(s) in the baseline and/or project scenario |
| **Source of data** | Data sourcing will be conducted according to Box 1 in VM0042 |
| **Description of measurement methods and procedures to be applied** | Determined in sample unit i from grower management practice information on agricultural activities. |
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower applying cover crop(s) |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | Modelling baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | CC_termination product |

| | |
|---|---|
| **Data unit** | Categorical value |
| **Description** | Chemical product used for Cover Crop termination in the baseline and/or project scenario |
| **Source of data** | Data sourcing will be conducted according to Box 1 in VM0042 |
| **Description of measurement methods and procedures to be applied** | Determined in sample unit i from grower management practice information on agricultural activities |
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower applying cover crop(s) |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | Modelling baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| **Data / Parameter** | Date_Applied_SN |
|---|---|
| **Data unit** | Date in MM/DD/YYYY format |
| **Description** | Application Date of the synthetic fertiliser in the baseline and/or project scenario |
| **Source of data** | Agoro Carbon will follow the requirements of Box 1 regarding data collection sourcing and will use various data sources such as 1) as applied maps 2) invoices where possible 3) attestation form from the farmers |
| **Description of measurement methods and procedures to be applied** | Determined in sample unit i from grower management practice information on agricultural activities |
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower applying synthetic fertilizer |

| | |
|---|---|
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | Modelling baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Date_Applied_OF |
| **Data unit** | Date in MM/DD/YYYY format |
| **Description** | Application Date of the organic fertilizer in the baseline and/or project scenario |
| **Source of data** | Agoro will follow the requirements of Box 1 regarding data collection sourcing and will use various data sources such as 1) as applied maps 2) invoices where possible 3) attestation form from the farmers |
| **Description of measurement methods and procedures to be applied** | Determined in sample unit i from grower management practice information on agricultural activities |
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower applying organic fertiliser |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | Modelling baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Harvest_Date |
| **Data unit** | Date in MM/DD/YYYY format |

| | |
|---|---|
| **Description** | Date of the crop harvest in the baseline and/or project scenario |
| **Source of data** | Agoro Carbon will follow the requirements of Box 1 regarding data collection sourcing |
| **Description of measurement methods and procedures to be applied** | Determined in sample unit i from grower management practice information on agricultural activities. |
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | Modelling baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Tillage_Date |
| **Data unit** | Date in MM/DD/YYYY format |
| **Description** | Date of the reduced tillage / no till event in the baseline and/or project scenario |
| **Source of data** | Agoro will follow the requirements of Box 1 regarding data collection sourcing and will use various data sources such as e.g. 1) as applied maps 2) attestation form from the farmers |
| **Description of measurement methods and procedures to be applied** | Determined in sample unit i from grower management practice information on agricultural activities. |
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |

| | |
|---|---|
| **Purpose of data** | Modelling baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Tillage_Type |
| **Data unit** | Categorical value |
| **Description** | Type of tillage applied in the baseline and/or project scenario |
| **Source of data** | Agoro Carbon will follow the requirements of Box 1 regarding data collection sourcing and will use various data sources such as e.g. 1) as applied maps 2) attestation form from the farmers |
| **Description of measurement methods and procedures to be applied** | Determined in sample unit i from grower management practice information on agricultural activities. |
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | Modelling baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Irrigation_Amount |
| **Data unit** | cm |
| **Description** | Amount of water applied for irrigation in the baseline and/or project scenario |
| **Source of data** | Agoro will follow the requirements of Box 1 regarding data collection sourcing |
| **Description of measurement methods** | Determined in sample unit i from grower management practice information on agricultural activities. |

| | |
|---|---|
| **and procedures to be applied** | |
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower applying irrigation |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | Modelling baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Irrigation_Type |
| **Data unit** | Categorical value |
| **Description** | Type of irrigation applied in the baseline and/or project scenario |
| **Source of data** | Agoro Carbon will follow the requirements of Box 1 regarding data collection sourcing |
| **Description of measurement methods and procedures to be applied** | Determined in sample unit i from grower management practice information on agricultural activities. |
| **Frequency of monitoring/recording** | Each growing season |
| **Value applied** | Specific for each grower applying irrigation |
| **Monitoring equipment** | N/A |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | Modelling baseline and project emissions |
| **Calculation method** | N/A |
| **Comments** | None |

| Data / Parameter | Irrigation_Start_Date |
| --- | --- |
| Data unit | Date in MM/DD/YYYY format |
| Description | Start date of irrigation event in the baseline and/or project scenario |
| Source of data | Agoro will follow the requirements of Box 1 regarding data collection sourcing |
| Description of measurement methods and procedures to be applied | Determined in sample unit i from grower management practice information on agricultural activities. |
| Frequency of monitoring/recording | Each growing season |
| Value applied | Specific for each grower applying irrigation |
| Monitoring equipment | N/A |
| QA/QC procedures to be applied | N/A |
| Purpose of data | Modelling baseline and project emissions |
| Calculation method | N/A |
| Comments | None |

| Data / Parameter | Irrigation_End_Date |
| --- | --- |
| Data unit | Date in MM/DD/YYYY format |
| Description | Type of irrigation applied in the baseline and/or project scenario |
| Source of data | Agoro Carbon will follow the requirements of Box 1 regarding data collection sourcing |
| Description of measurement methods and procedures to be applied | Agoro Carbon will follow the requirements of Box 1 regarding data collection sourcing |
| Frequency of monitoring/recording | Determined in sample unit i from grower management practice information on agricultural activities. |
| Value applied | Each growing season |
| Monitoring equipment | Specific for each grower applying irrigation |

| | |
|---|---|
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | N/A |
| **Calculation method** | Modelling baseline and project emissions |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Grain, strawStoverHayRemoval |
| **Data unit** | % |
| **Description** | Representing how the crop was harvested to determine % residue removal . e.g., grain only (0%), grain with straw, stover or residue removal (assigning 50% as an average based on literature review), bailed straw (assigning 30% based on literature review) in the baseline and/or project scenario |
| **Source of data** | Agoro Carbon will follow the requirements of Box 1 regarding data collection sourcing: Different data sources will be used, e.g. imagery / attestation form from the farmers |
| **Description of measurement methods and procedures to be applied** | Agoro Carbon will follow the requirements of Box 1 regarding data collection sourcing |
| **Frequency of monitoring/recording** | Determined in sample unit i from grower management practice information on agricultural harvest activities. |
| **Value applied** | Each growing season |
| **Monitoring equipment** | Specific for each grower |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of data** | As model harvest options, mapping harvest parameters. Calculation of baseline and project practice emissions |
| **Calculation method** | Modelling baseline and project emissions |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Burn_Date_Month |
| **Data unit** | Date in DD/MM/YYYY format |
| **Description** | Date of burning event |

| | |
|---|---|
| **Source of data** | Farmer attestation and/or farm management records (farm records) will be sourced according to Box 1 in VM0042. |
| **Description of measurement methods and procedures to be applied** | Agoro will follow the requirements of Box 1 regarding data collection sourcing |
| **Frequency of monitoring/recording** | Determined in sample unit i from grower management practice information on agricultural activities. |
| **Value applied** | Each harvesting season |
| **Monitoring equipment** | Specific for each grower |
| **QA/QC procedures to be applied** | N/A |
| **Purpose of Data** | N/A |
| **Calculation method** | Modelling baseline and project emissions |
| **Comments** | None |

| | |
|---|---|
| **Data / Parameter** | Burn_Type |
| **Data unit** | Categorical value |
| **Description** | Residue Type Burned (e.g. Wheat, maize, rice, sugarcane, other crops residue) in the baseline and/or project scenario |
| **Source of data** | Farmer attestation and/or farm management records (farm records) will be sourced according to Box 1 in VM0042. |
| **Description of measurement methods and procedures to be applied** | Agoro Carbon will follow the requirements of Box 1 regarding data collection sourcing |
| **Frequency of monitoring/recording** | Determined in sample unit i from grower management practice information on agricultural activities. |
| **Value applied** | Each harvesting season |
| **Monitoring equipment** | Specific for each grower |
| **QA/QC procedures to be applied** | N/A |

| | |
|---|---|
| **Purpose of Data** | N/A |
| **Calculation method** | Modelling baseline and project emissions |
| **Comments** | None |

The parameters related to the monitoring of the SDGs are listed in the SD Vista project documentation.

## 5.3 Monitoring Plan

**Organisational structure of the project**

The organisational structure of Agoro Carbon, responsibilities and competencies of the personnel that will be carrying out monitoring activities is presented in the figure below:

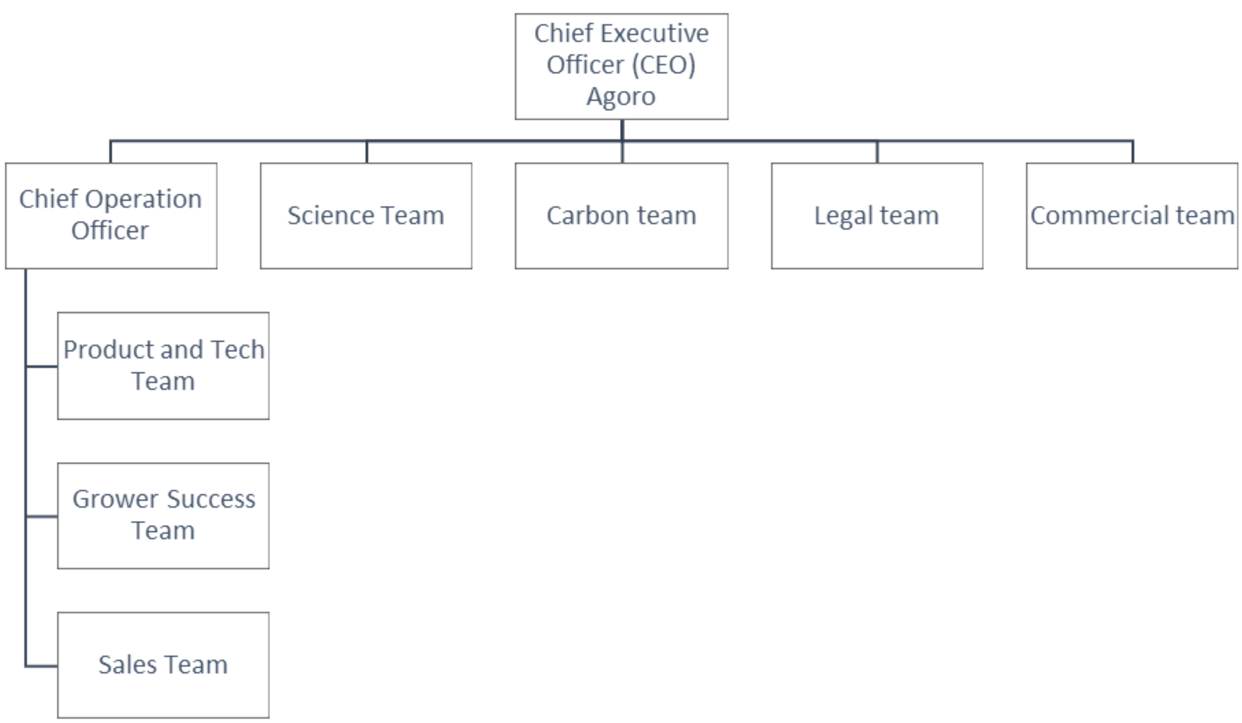



Figure 16: Organisational structure of Agoro Carbon

The overall coordination of the project activities is conducted by the Carbon Team (CT) of Agoro Carbon, reporting to the CEO of the company. The team is responsible for project MRV coordination, compiling documentation for project validation and verification, developing carbon project design, setting up monitoring and verification activities and assuring that project development and operation is conducted in line with the VERRA requirements. The team is composed currently of several members, each responsible for different design elements of the project. Absolute majority of the team members have been involved in the past in carbon project development under VCS and audit of carbon projects.

The responsibility for baseline and project data management and evidence collection, data analysis and storage, data QA/QC processes and customer support for producers throughout the duration of their contract lies within the Grower Success Team (GST). The Grower Success Team assumes responsibility for collecting, analyzing, and storing historical and monitoring data and evidence related to the MRV. Furthermore, the team is responsible for performing quality assurance and quality control checks on the data, as well as for collecting yearly monitoring data and supporting evidence. In addition, the team is responsible for the development and monitoring of the individual plan for each farmer enrolled in the Program for the project practises implementation and ensuring that the contract is adhered to, while providing continuous agronomic support and guidance to the farmers on following the implementation plan.
The team is composed of highly skilled agronomists who also have experience as producers, specializing in various areas such as conservation practices, precision agriculture, ag data, seed, chemistry, nutrition, and manure management. Together, the team boasts an impressive 142 years of field experience and 49 years of education, gained from prominent companies as well as renowned organisations like Soil Health Partnership, Colorado State University, USDA (ARS), Michigan State University, and Oklahoma State University.

Project tasks related to stratification of project area, soil sampling processes and GHG modelling and quantification are performed by the Science team (ST). The team is responsible for carbon and other greenhouse gas (GHG) modelling and quantification, which is required under VCS for the certification of soil organic carbon (SOC) stocks in grower fields in line with rigorous scientific standards. The team also performs QA/QC processes on the data analyzed. These activities are necessary in order to evaluate the amount of SOC sequestration associated with the regenerative agricultural practices that project farmers are going to implement on their contracted acres.
To achieve this objective, Agoro Carbon has assembled a team of highly skilled scientists with diverse expertise in areas such as remote sensing/geospatial procedures, carbon and other GHG modelling methodology, pasture and range management methodology, agronomic management and soil science.

Product and tech team is developing digital solutions to enable more effective enrollment of the farmers to the Agoro Carbon Platform and to allow the farmers to assess their carbon potential from project practices implementation. Further, the team is performing part of QA/QC tasks on a regular basis to check the correctness of data input on the acreages enrolled in the Program.

The activities related to the initial engagement of the farmers into Agoro Carbon Program, ex-ante estimation of emission reductions for specific fields, drafting and signing the contract with the farmers for the implementation of the project practices are performed by our Sales Team. Presently, the team comprises several members with a wide range of expertise in various aspects of agriculture, which are key areas of our operations.

Legal team of Agoro Carbon supports the project in analysing and implementing the regulatory requirements, creating necessary documentation for the enrolled of the farmers into the Program. The team is also responsible for handling all legal matters related to contractual relationships with farmers.

Commercial team of Agoro Carbon handles all communication and interactions related to the sale of the carbon credits.

The breadth of knowledge and skills within the teams ensures that Agoro Carbon adheres to Verra's methodologies and utilizes best-in-class procedures for the verification of carbon credits.

### GHG information system

GHG information system for obtaining, recording, compiling, and analyzing data and information important for quantifying and reporting GHG emissions and/or removals relevant for the project (including leakage) and baseline scenario is presented in the Figure below.

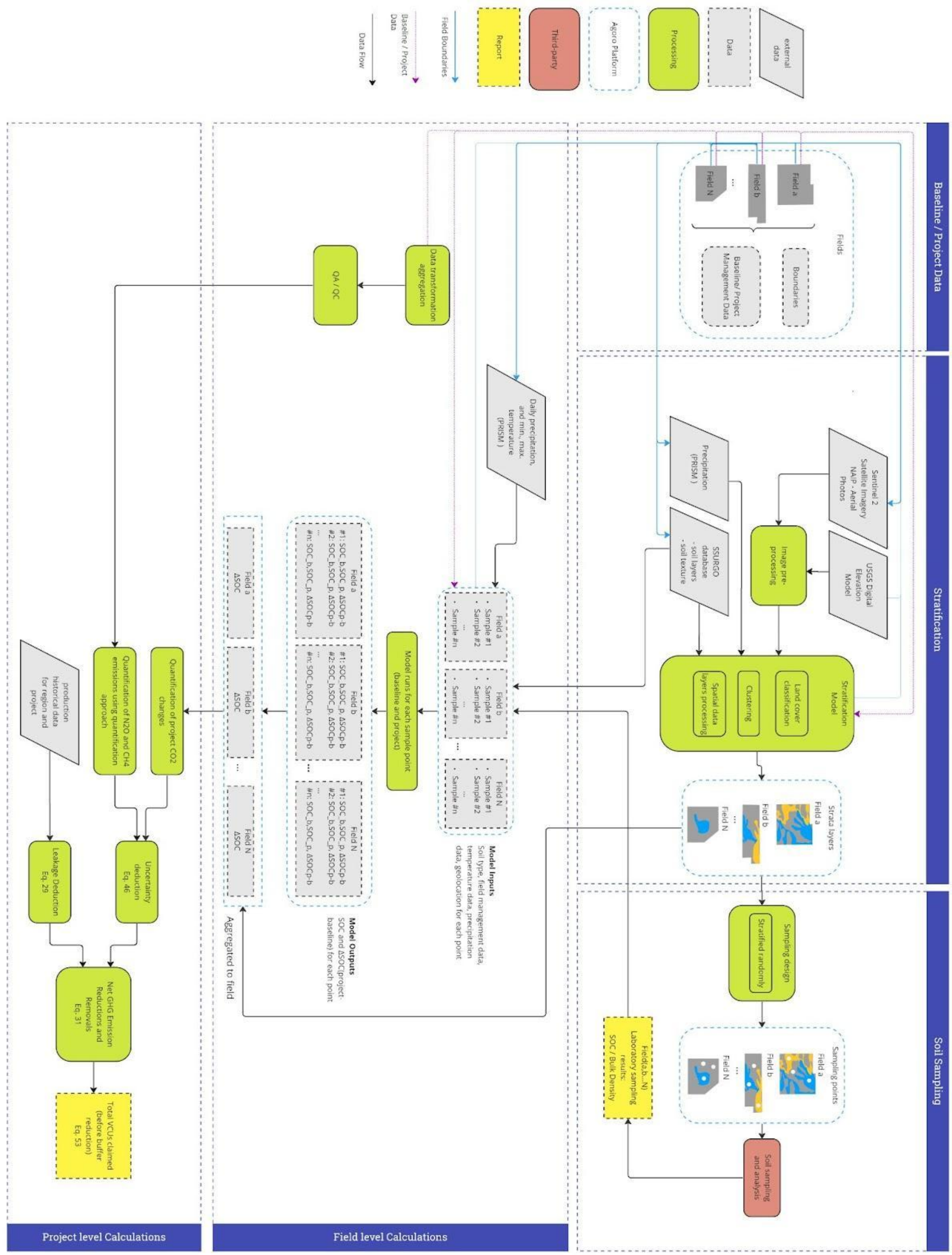



Figure 17: Data system map

The methods for measuring, recording, storing, aggregating, collating and reporting data and parameters as well as anticipated frequency of monitoring will be followed as described in Sections 5.1. and 5.2 of the PDD in the corresponding sections for each parameters and as described further below. Sections 5.1. and 5.2 also outlines what type of data and in which format the data is already collected or is going to be collected for the project, including parameters to be measured and parameters required for the DayCent model.

## Data collection and storage

VM0042 specifies that the agricultural management information a project must collect depends on the input variables required by the model used (Quantification approach 1, Measure and model) to quantify soil organic carbon stock change, as well as the variables required to estimate the gases included in the project boundary quantified using Quantification Approach 3 (e.g. $N_2O$ emissions from use of organic amendments or synthetic nitrogen (N) fertilizers). Box 1 in VM0042 distinguishes between the preferred data sources for qualitative versus quantitative data. Qualitative information is determined by consultation with, and substantiated with a signed attestation from, the grower or landowner of the field. Quantitative information is sourced as available according to the hierarchy of preferred sources outlined in Box 1, in the following order: historical management records or remote sensing, historical management plans, grower attested values that align with values for similar fields, or regional values.

The primary data collection for the farmers-specific baseline data and the project monitored data, as presented in Section 5.2. of the PDD, is conducted by the grower success team agronomists. The agronomists of the grower success team, during their first field visits to the farms, discussed needed data and documentation with the farmers during their onboarding phase. The baseline data for initial project instances was recorded by agronomists,taking into consideration producer historical and practice change data for PDD and carbon modelling. In the future, all the data will be collected through the Agoro Carbon data management platform deployed in AWS. Field boundaries of the farmers enrolled are initially entered into a software application called Agrian via the import of provided digital files from farmers or their business partners or digitally drawn in the software. These boundaries are then exported out of Agrian as shapefiles and served as input for the stratification process. Currently this process is also migrating to Agoro Carbon Platform.

Project data reported during the monitoring stage of the project is planned to be collected and stored in the Agoro Carbon data management platform. In addition, during on-farm support visits with enrolled farmers, the agronomists will be taking images of fields to compare 'before' and 'after' views and assess the effectiveness of the implementation plan for the farmers for the implementation of project practices, which will be also stored on the Agoro Carbon Platform.

Agoro Carbon will maintain a stable backend database in which all relevant data for project monitoring will be stored. All farmers and fields are assigned unique IDs to which management data, sample data, and model runs will be associated through a relational database system. Data will be archived for the entire project period. Should any file formats or data models be updated, all prior datasets will be made forward compatible to permit continued comparison throughout the project period. All documents and records will be kept in a secure and retrievable manner for at least two years after the end of the project crediting period.

Agoro Carbon will be also responsible for all data archiving and maintenance of DayCent, and regular evaluation and/or maintenance of Agoro Carbon's various data services that provide the necessary inputs for the DayCent model.

### Sampling design

Soil carbon stock levels have considerable spatial variability within any given field. The spatial heterogeneity of SOC presents a significant challenge to project developers like Agoro Carbon to measure SOC with the accuracy required by the VCS. In addition to the spatial heterogeneity issues, many other principles of climate farming practices and relationships between the producer and the project developers complicate the carbon measurement via the sampling process. Also, it is economically impossible to sample and measure SOC for the entire area of a given field. Therefore, a strategic sampling design that balances all these factors is needed to implement a successful carbon project.

Agoro Carbon has developed a soil sampling design protocol to collect soil cores for soil organic carbon  stock estimates. The protocol complies with the requirements by VM0042 but with more workable and achievable steps that can be implemented for commercial operations with considerations for cost, efficiency, quality, and SOC estimated accuracy. The protocol includes five key steps from quality land classification to the final stage of data sharing and QA/QC evaluation by stakeholders (Figure 1). For each step, the data sources, methods, and justification with a literature review for the scientific merit of the approach are provided to indicate the validity, certainty, and simplicity of the approaches. More details on this process are provided in the Agoro Carbon Standard Operation Procedure (SOP) Report_Sampling_Design.

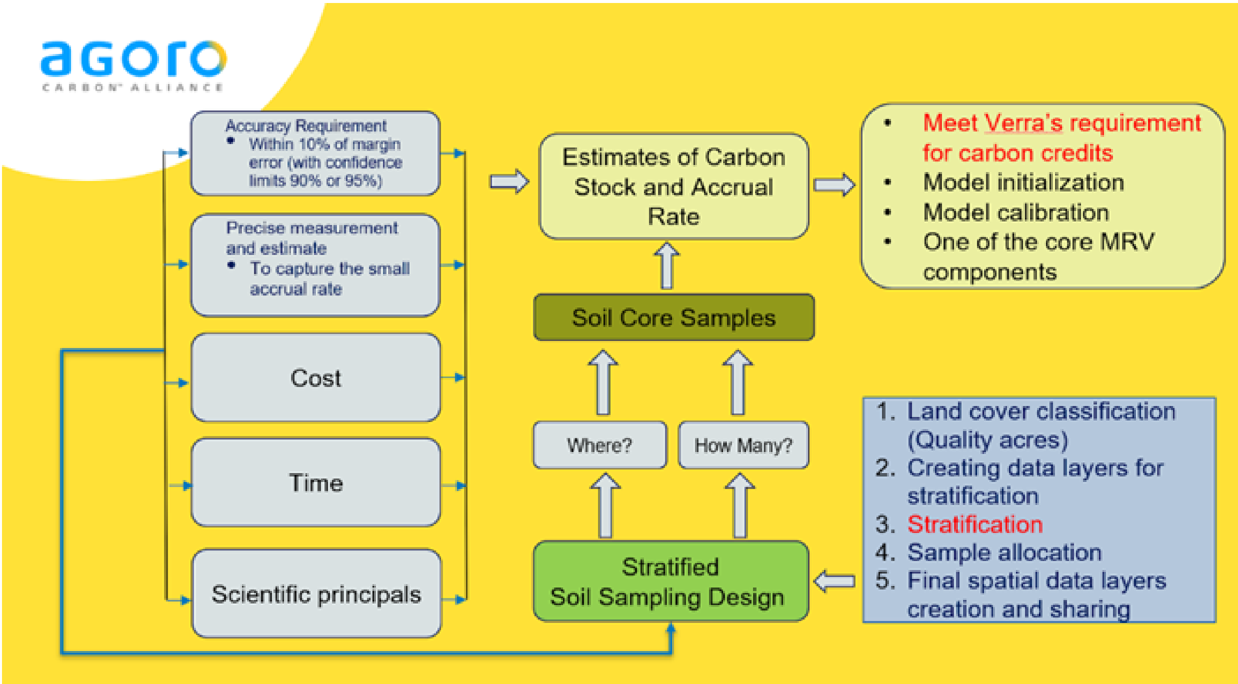



Figure 18: Framework of soil carbon sampling design

### Stratification

Soil sampling design starts with the definition of the stratification process which is used to divide the producer's farm into segments of land, which is going to be used to define points where the soil sampling is going to take place. Stratified, random sampling design is used by the project, which implies stratifying heterogeneous landscapes with varying soil carbon content into stratum by using different data layers, or covariants that are highly correlated to soil carbon. Each stratum represents a relatively homogenous subunit of land with minimal variation of SOC within a given stratum subunit; and maximum differences of SOC across the different strata, which is a more accurate representation of a field's SOC content than a random sampling approach. After the strata are created, sampling locations are randomly assigned for each stratum separately.

Agoro Carbon's goal is to estimate soil carbon stock at the project's initial stage, again at year five, and finally in year ten at the conclusion of grower carbon contracts with the necessary accuracy, while meeting Agoro Carbon's business mission and operation schedules. Following VCS requirements, Agoro Carbon has customised and developed an operational sampling design approach to ensure a margin of error of less than 10% at the 90% confidence level.

Agoro Carbon defines the total area (acres) of land enrolled in it's carbon project by each producer as the unit or population to be sampled and analyzed for SOC, allowing Agoro Carbon to report the mean carbon stock for each grower's property along with the estimated uncertainty, standard deviation and confidence limits of the estimate.

Stratification process is performed by using a stratified random sampling design, with the samples randomly allocated to each stratum. The approach utilises five steps (Fig. 1) involved in designing a sampling scheme that maximizes the accuracy of carbon measurement while minimizing the cost, which includes 1) Land cover classification, 2) Creating data layers for stratification, 3) Stratification, 4) Sample allocation, and 5) Final spatial data layers creating and sharing.

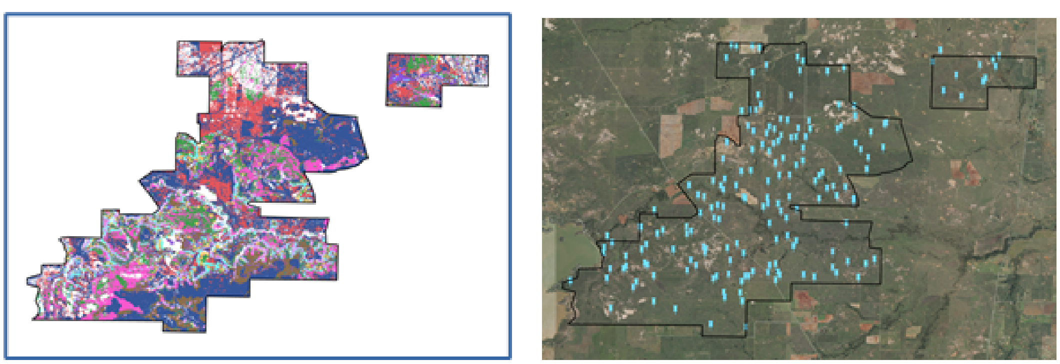
For the purpose of stratification, land cover classification is based on aerial photos which are obtained from the National Agriculture Imagery Program (NAIP) of the USDA, and satellite imagery of Sentinel-2 and Landsat 8-9. The classification is completed by using an object-oriented approach and Random Forest (RF) machine learning algorithm provided in eCognition software package.

The data layers, potentially having covariations with SOC, including topographic position (Topographic Position index (TPI) and Topographic Wetness Index (TWI)), soil texture, slope, Normalized Difference Vegetation Index (NDVI), soil color index (CI), and precipitation, were created for Agoro Carbon's land stratification. The data from publicly available sources were processed with standardized procedures and tools provided in the ArcGIS software package (www.esri.com). Besides those layers, polygon layers detailing the property boundary and areas where management practices are implemented were also created with information provided by farmers.

The process of stratification, i.e. subsetting the land into strata, was performed based on the similarity of the combined data layers: land cover, slope position, soil texture (fractions of clay, sand, and silt), TWI, NDVI, CI, precipitation, and management unit. Two standard procedures for cluster analysis from SAS (www.sas.com), Proc Fastclus and Proc Cluster representing K-means and Hierarchical cluster methods were used for this purpose. Sample allocation to each stratum of all the strata per a grower's property was completed with the statistical survey data analysis procedures available in SAS, Proc Surveyselect.

After completion of sampling allocation, a point GIS data layer was created with unique identification of CoreID, and other associated attributes. A polygon GIS data layer was also created with two attributes of land cover classification and stratification codes.

An example of stratification results – identification of different strata and soil sample locations design for soil sampling and analysis is shown in Figures below.



Figures 19: Stratification examples

The outputs from stratification with samples to be taken for soil analysis were checked for points that are in a place that is not reachable, etc., to exclude those from the soil sampling process. After this AQ/QC process, the location of the points to be sampled were sent to the soil sampling company.

### Soil sampling and analysis

Soil sampling and analysis is needed in order to determine how much carbon is in the soil at the beginning of project implementation. The result of the soil analysis is going to be compared after 5 and 10 years, in order to quantify how much carbon has been sequestered as result of project activity implementation.

For the soil sampling and analysis of soil samples Agoro Carbon is using third parties (soil sampling partner). Soil sampling partner is the one in charge of taking the soil samples and sending the soil samples to the lab. After the sample is pulled and documented, they are sent to the accredited laboratories so they can run their test for SOC determination. The parameters analysis by the laboratories included inter alia Soil Bulk Density (Dry) and Total Carbon, % (from dry combustion).

The results of soil sample analysis are then sent to Agoro Carbon back in a .CSV and .PDF format, already paired with the locations of the samples. Laboratory results of soil sample analyses are reviewed for outliers and errors before being submitted for baselining process and modelling baseline emissions. Soil sampling and analysis is performed according to an internal SOP titled Agoro Carbon Lab Testing Services Workflow.

### Modelling design

For estimating net impact of project activities on soil carbon stocks across the project area and modelling $CO_2$ emissions the project will use the DayCent model. Because of its ability to model SOC to a depth 30 cm, and applicability to project domain the DayCent model was selected over other competing models for estimating SOC and issuing carbon credit in years in between soil sampling events. Primary inputs and outputs of the model are depicted in the Figure below.

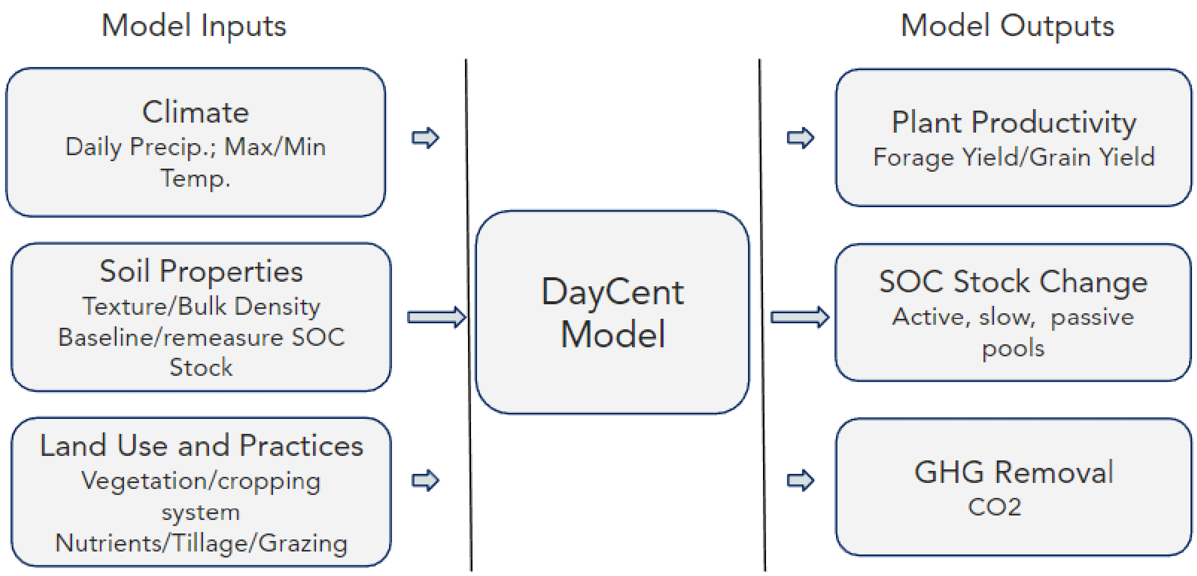



Figure 20: DayCent Model: Primary Inputs/Outputs

DayCent model will be validated as per the procedures outlined in VMD0053 and described in the corresponding Model Validation Report. The Model Validation Report includes more extensive detail on model calibration, structure/parameters, and uncertainty, as well as modelling plan, all validation datasets and QA/QC procedures deployed.

### GHG emission reporting and quantification

The result of the soil sampling will be used for the baseline and project emission quantification by the DayCent model, in addition to using the quantification approach for the definition of $N_2O$ and $CH_4$ emissions. The calculation of the GHG emissions will be performed in Agoro Carbon data management Platform or other quantification tool, such as e.g. in Microsoft Excel. The dedicated project teams (Science and GST teams) will be responsible for QA/QC processes of these calculations. Based on the provided GHG emissions values Carbon Carbon team will be responsible for the reporting of the carbon emissions in PDD, updating permanence assessment if needed and submission of all necessary information to the validation and verification by VVB.

### Internal auditing and QA/QC

For the soil analysis data reported by the laboratories, Agoro Carbon will conduct additional post-hoc QA/QC analyses to identify potential anomalous values and deal with them accordingly. For each sampled field, the distribution of laboratory data will be compared against expected distributions based on existing datasets from comparable fields, POLARIS, or SSURGO, in that order of priority. Should a given sample fall outside the 95% confidence interval of that distribution, a review will be triggered whereby sample collection metadata and field management data will be assessed to determine if there is a plausible explanation for the anomalously high value. If there is, this explanation will be provided at verification. If no explanation is satisfactory, these values and points will be removed so as to maintain a conservative emissions removal estimate.

For the data reported by the farmers the data will undergo QA/QC processes as determined in the sections 5.1. and 5.2 for each parameter. In addition, the members of the GST team will conduct the QA/QC process on the primary data input based on the four-eyes principles, where the data will be controlled for data gaps, outliers, inconsistencies and missing supporting evidence. Any open issues identified will be addressed by the GST team in line with the applied methodology.

The calculation of GHG emissions for the PDD will be conducted by the Agoro Carbon team, conducting also the QA/QC of the calculations and plausibility check following four eyes principle.

For the QA/QC of project practices implementation, the GST team in addition will conduct annual monitoring follow-up based on the producer's implementation plan and data collection to track progress and adjust implementation plans as needed.

### Baseline re-evaluation

As required in VM0042 v1.0 and according to the VCS requirements, Agoro Carbon will re-evaluate the baseline schedule of activities every 10 years in the project period to assess whether the commercial crops simulated in the baseline are in continued production in regions in which project instances are located. Agoro Carbon will perform these comparisons at the state level, similar to how it performs its common practice assessments. Using production data from USDA NASS and the Cropland Data Layer from the 5 years prior–or equivalent data sources if these are replaced in future–Agoro Carbon will assess the average proportion of agricultural acres within the state dedicated to producing the crops simulated in the baseline schedule of activities. Should that proportion have decreased substantially as compared to a similar assessment for t0, Agoro Carbon will consider that decrease as evidence that production has substantially declined and that the baseline commercial crops should be modified per the procedures outlined in VM0042 v1.0 or future versions of VM0042 at the point of re-evaluation.

# APPENDIX

*Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.*